城市，让生活更美好
Better City, Better Life

SHANGHAI MANUAL

A Guide for Sustainable Urban Development
in the 21st Century · 2024 Annual Report

UN-Habitat
Bureau International des Expositions
Shanghai Municipal People's Government

Supported by Ministry of Housing and
Urban-Rural Development of the People's Republic of China

Shanghai Scientific & Technical Publishers

Youth Leading Climate and Local Action for Cities

城市，让生活更美好
Better City, Better Life

SHANGHAI MANUAL

A Guide for Sustainable Urban Development
in the 21st Century · 2024 Annual Report

UN-Habitat
Bureau International des Expositions
Shanghai Municipal People's Government

Supported by Ministry of Housing and
Urban-Rural Development of the People's Republic of China

Shanghai Scientific & Technical Publishers

Preface 1

How can cities unlock green economy opportunities and engage young people to accelerate green growth? What is the role of young people in shifting fundamental beliefs and behaviours on climate change and building climate awareness among local communities? What is the role of technology and digital innovation in driving youth-led climate action? These are some of the questions that this year's edition of the *Shanghai Manual* strives to answer, presenting scalable solutions for municipal actors across the globe.

The *Shanghai Manual 2024: A Guide for Sustainable Urban Development in the 21st Century*, represents the multilateral cooperation between the United Nations Human Settlements Programme (UN-Habitat), the Bureau of International Expositions, and the Municipal Government of Shanghai, the People's Republic of China. In line with the theme of World Cities Day 2024, this year's report focuses on 'Youth leading climate and local action for cities." It highlights global urban best practices in the spheres of economy, society, environment, culture, governance, and international cooperation. The report also features a special chapter on technology and digital innovation for youth-led climate action, as well as a chapter on the winning cities of the Shanghai Award 2024.

While urban areas across the world face unparalleled converging environmental crises, young people, ambitious innovators and changemakers hold the key to tackling the climate crisis. To mobilize and unlock the capabilities of younger generations, cities must empower the youth to act and join the fight against climate change.

The *Shanghai Manual 2024* sheds light on innovative initiatives paving the way for youth-led climate responses in cities around the world. By showcasing urban best practices, the Manual emphasizes the necessity to take imminent action on climate change, with young people at the forefront. It presents 18 case studies across several regions and makes 23 key policy suggestions, each serving as unique references for municipal decision-makers to accelerate sustainable urban development.

I extend my warmest congratulations for the publication of the 2024 edition of the *Shanghai Manual*, and I encourage partners to read and reflect on the cases outlined in this report. I am confident that this report will provide urban leaders and various stakeholders with practical guidance and the inspiration needed to help unlock the potential of cities in climate action, sustainable urbanization, and implementation of the 2030 Agenda for Sustainable Development and New Urban Agenda.

Anacláudia Rossbach
United Nations Under-Secretary-General
and Executive Director of UN-Habitat

Preface 2

As urbanisation accelerates globally, cities stand at the forefront of both the challenges and solutions to climate change. More than ever, cities are not just bustling centres of economic activity and cultural exchange but also critical spaces where sustainable practices must be implemented to secure a better future.

The pivotal role of cities in fostering social, economic and technological evolutions was recognised and celebrated at Expo 2010 Shanghai with its theme "Better City, Better Life". While focusing on improving urban living, Expo 2010 Shanghai also emphasised the critical role of education, raising awareness, and empowering youth—key elements in fostering sustainable development. Hundreds of nations were welcomed in China to collectively imagine new forms of urban living and to exchange on making the future city a place with health, sustainability and community spirit at its core.

A central part of the legacy of Expo 2010 Shanghai was the creation of the *Shanghai Manual*, gathering case studies and best practices from real-life urban policies, experimentations and observations. Jointly published by the Bureau International des Expositions, UN-Habitat, the Shanghai Municipal People's Government, and with the support from the Ministry of Housing and Urban-Rural Development of the People's Republic of China, the *Shanghai Manual* serves as a vital resource for shaping more sustainable and more liveable cities.

This 2024 edition of the *Shanghai Manual*, titled 'Youth Leading Climate and Local Action for Cities', takes a focused look at the intersections between urbanism, climate action, and youth leadership. As the generation that will experience the long-term effects of today's choices, young people are uniquely positioned to drive innovation and offer solutions that can be scaled and replicated to create sustainable, inclusive cities. Their active engagement is critical not only for addressing current challenges but also in shaping greener cities for future generations.

Building on the transferable knowledge and experience of its past editions, the *Shanghai Manual* this year illustrates how youth-led climate action is essential in making a tangible impact in cities around the world. The outstanding contributions and case studies highlighted in this edition underscore the importance of cross-sector collaboration, and emphasise the need to broaden participation in urban decision-making as a way to empower youth in climate action and to build more resilient urban systems.

The following chapters present a series of actionable strategies that cities can adopt to create environments where young people can thrive as agents of change. These approaches ensure that youth-led innovations and ideas are not only heard but also implemented at the local level. Inspired by the collaborative spirit of Expo 2010, these case studies and policy recommendations offer a roadmap for cities to navigate the complexities of the climate crisis while empowering the next generation of leaders to build a more sustainable, resilient future.

With the energy, creativity, and determination of today's youth, we have the potential to transform our cities into spaces that are not only safe and comfortable to live and work in but also cornerstones of a future society that is both sustainable and inclusive for all.

Dimitri S. Kerkentzes

Secretary General of the Bureau International des Expositions (BIE)

Acknowledgements

This annual report represents a collaborative effort, made possible by the contributions of many people.

We would like to extend our deepest gratitude to Ms. Anacláudia Rossbach, Executive Director of UN-Habitat, for her dedication and support in preparing the *Shanghai Manual · 2024 Annual Report*. Our appreciation also goes to Ms. Maimunah Mohd Sharif, the former Executive Director of UN-Habitat, for her advocacy of the *Shanghai Manual* as a crucial document in the implementation of the 2030 Agenda for Sustainable Development and the New Urban Agenda. We are also thankful to the UN-Habitat experts from various divisions and offices who contributed by reviewing the *Shanghai Manual* and offering valuable advice, including Rong Yang, Sam Gillatt and Siqi Chen from UN-Habitat Regional Programmes Division; UN-Habitat Regional Office for Asia and the Pacific; UN-Habitat Regional Office for Africa; UN-Habitat India Country Office; UN-Habitat EU Office; UN-Habitat Global Solutions Division; and Stephanie Briggs as the English copy editor.

We also thank Mr. Dimitri Kerkentzes, Secretary General at the Bureau International des Expositions, Mr. Antoine Bourdeix and their team for their sustained support and assistance in editing and revisions of the annual report. Their efforts have allowed us to continue promoting the “Better City, Better Life" spirit of the Shanghai World Expo through the release of the *Shanghai Manual* and its annual report.

We also express our gratitude to our colleagues from the Ministry of Housing and Urban-Rural Development of the People's Republic of China for their positive support and valuable input in the compilation and review of the 2024 Annual Report.

We would also like to express our deep appreciation to Chen Jining, Secretary of the CPC Shanghai Municipal Committee; Gong Zheng, Mayor of Shanghai; Zhang Xiaohong, Vice Mayor of Shanghai; and Wang Weiren, Deputy Secretary of the CPC Shanghai Municipal Committee, for their support and care in preparing the annual report. We also gratefully acknowledge the valuable contributions of those who assisted in the development and coordination of this report, in particular to: Then-Director Hu Guangjie, Vice Director Jin Chen, Chief Engineer Liu Qianwei, Peng Bo, Ding Jian from Shanghai Municipal Commission of Housing, Urban-Rural Development and Management; Dr. Cheng Jian, Xu Qian, Gong Ying, Wang Chanya, Rong Yu, Mao Yingjuan and He Tiantian from the Shanghai Coordination Center of World Cities Day.

The Shanghai Coordination Center of World Cities Day rallied numerous expert teams to prepare this annual report. The leading experts from each team are: Dr. Wang Xin from UNEP-Tongji Institute of Environment for Sustainable Development; Professor Zeng Gang and Associate Professor Zhu Yiwen from East China Normal University; Professor Yu Hai from Fudan University and Associate Professor Zhong Xiaohua from Tongji University; Dr. Chen Haiyun from Tongji University; Research Fellow Yang Rongbin and Ms. Sheng Yang from Shanghai Library (Institute

of Scientific & Technical Information of Shanghai); Professor Peng Zhenwei and Associate Professor Chen Chen from Tongji University; Research Fellow Yu Hongyuan and Dr. Zhu Yunjie from Shanghai Institutes for International Studies (listed in the order of chapters). Notably, Professor Peng Zhenwei is responsible for the theme development and framework of the annual report as the chief expert. We also extend our heartfelt thanks and deep appreciation to all the authors for their outstanding contributions to this report.

Special commendation goes to Director Qi Yan, Pu Haihong, Shi Xiaochen, and Chai Hui from the Development Research Center of the Shanghai Municipal People's Government for their insightful advice in shaping the structure of this report and their thorough review.

Lastly, we extend our thanks to Shanghai Scientific & Technical Publishers and our translation service provider, YGYM Translation Service Co., Ltd., for their meticulous and thorough work.

Contents

Chapter 1 Introduction 1

Chapter 2 The best practices of the Global Award for Sustainable Development in Cities (Shanghai Award) 2024 winning cities 13

Introduction 15
Agadir, Morocco 16
Doha, Qatar 23
Iztapalapa, Mexico 33
Melbourne, Australia 42
Thiruvananthapuram, India 50

Chapter 3 International Cooperation: youth-oriented international collaboration and exchange 57

Introduction 59
Case studies 60
Ho Chi Minh City, Viet Nam Multidimensional participation of youth in climate governance through cooperation between urban government and international organizations 60
Capacity-building for environment and sustainable development through South-South cooperation 68
Prajatantra, India A national youth festival on city governance 73
Rome, Italy Youth4Climate: Sparking Solutions Event 78
Dubai, the United Arab Emirates COP28 79
Policy suggestions 81

Chapter 4 Economy: empowering youth to drive green economic development 83

Introduction 85
Case studies 87
Johannesburg, South Africa The Separation@Source programme: transitioning to a recycling economy 87
Kunming, China Youth partnership enhances ecological value of Cuihu Park 90
Rio de Janeiro, Brazil Coletivo Nossa Horta creates urban green spaces 96
Lagos, Nigeria Recycling scheme for women and youth empowerment 102
Jiujiang, China Construction of a youth-friendly low-carbon park community in Chaisang District 103
Policy suggestions 104

Chapter 5 Society: youth leading inclusive green urban societies and communities 107

Introduction 109
Case studies 110
Nanning, China Youth-led community low-carbon construction action supported by community deliberation 110
Nairobi, Kenya and Dar Es Salaam, United Republic of Tanzania Developing Risk Awareness through Joint Action: co-designing weather and climate information services in urban informal settlements 116
Yangpu District, Shanghai, China Co-prosperity of youth and neighbourhood: sustainable renewal practice of Changbai neighbourhood 228 121
Hong Kong, China Green Hub: leading low-carbon lifestyles with green transformation of historic buildings 129
Marrakech, Morocco Pikala Bikes: building a cycling culture and livelihood opportunities through eco-guide training 130
Policy suggestions 132

Chapter 6 Environment: youth participation in building low-carbon and resilient cities 135

Introduction 137
Case studies 138
Liverpool, United Kingdom of Great Britain and Northern Ireland The URBAN GreenUP initiative 138
Hong Kong, China Development of Anderson Road Quarry Site 143
Xuhui District, Shanghai, China The practice of Leshan pocket park: a collaborative and participatory approach adopted by Xuhui District 148
Bandung, Indonesia The Youth Advocacy for Climate Action programme 153
Policy suggestions 154

Chapter 7 Culture: Youth-driven low-carbon culture and environmental innovation 157

Introduction 159
Case studies 160
Amsterdam, the Kingdom of the Netherlands Fashion for Good initiative 160
Chalandri, Greece Cultural Hidden IDendities ReAppear through Networks of WaTer: leveraging cultural heritage for blue-green urban regeneration 167
Chengdu, China Youth Power in the Luxelakes Park Community 171
Singapore Youth4Climate Festival 178
Korogocho, Kenya Future Yetu (Our Future) project: using digital storytelling to engage in community climate action 180
Policy suggestions 181

Chapter 8 Governance: youth-oriented urban and community co-governance platforms 183

Introduction 185

Case studies 186
Buenos Aires, Argentina The Buenos Aires Climate Action platform: enabling citizen-driven urban climate action 186
Los Angeles, United States of America Mayor's Youth Council for Climate Action 190
Lima, Peru Lima Youth Action: enhancing youth participation in local governance 192
Mombasa, Kenya Youth-led mangrove ecosystem resilience and climate adaptation in coastal urban communities 196
Policy suggestions 202

Chapter 9 Technological and digital innovation for youth-led urban climate action 205

Introduction 207
Harnessing smart digital and green technologies to drive urban climate action 207
The role of smart digital technologies in achieving climate-conscious cities 207
Integrating green technologies to secure sustainable urban futures 209
Amsterdam, the Kingdom of the Netherlands Energiesprong 210
Curitiba, Brazil Solar Pyramid Project 211
Supporting green education, training and entrepreneurship for young urban innovators 212
Developing youth-inclusive pathways into green careers 212
Youth Agency Marketplace 213
Supporting youth-led green entrepreneurship and innovation 215
Digitalization as a process to bridge the gap between cities and youth 216
Tallinn, Estonia The Klindi Park project: integrating digital citizen engagement solutions 217
Policy suggestions 221

Chapter 1

Introduction

Introduction[1]

Cities are at the front line of climate change. As hubs of knowledge and innovation, they are the primary engines to counteract adverse consequences and drive ambitious climate action. Where young people and future generations will bear the brunt of climate impacts, they are already in the driving seat to accelerate local action, generate new innovative climate solutions and ultimately realise sustainable urbanization. As transformative changemakers, cities are urged to facilitate inclusive climate action that incorporates the ideas and voices of young climate innovators into local decision-making. In corroboration with the theme of "Youth leading climate and local action for cities", the *Shanghai Manual: A Guide for Sustainable Urban Development in the 21st Century • 2024 Annual Report* illuminates contemporary urban development practices that are driving local climate action with a particular focus on youth-led initiatives. The report highlights the challenges and opportunities that cities are afforded in accelerating the influence and impact of young people in local climate action and development in cities around the world. It presents the 2024 Shanghai Award winning cities and reflects upon 18 core case studies across the dimensions of international cooperation, economy, society, environment, culture and governance, distilling more than 20 transferable policy suggestions for urban actors including mayors, municipal governments, urban planners and policymakers within the global community, to support them in accelerating youth-led climate and local action in their respective cities and municipalities. In addition, it explores the potential for technology and digital innovation to empower young people in climate action efforts and sustainable urban development.

Background: empowering youth in climate and local action

Climate change presents one of the most complex challenges of the 21st century. The United Nations Framework Convention on Climate Change (UNFCCC) and the Paris Agreement call for concerted global efforts to limit temperature increases to within 1.5 degrees Celsius above pre-industrial levels yet despite these international commitments, the gap between climate action and this critical target remains substantial. The International Energy Agency reports that global CO_2 emissions reached an all-time high in 2023, with energy-related emissions alone totalling 37.4 billion tons, underscoring the scale of the challenge.

To achieve impactful responses to climate change around the world, connected and aligned local action now serves as the primary foundation in which cities and their leaders have the opportunity to press the accelerator on proactive climate action and sustainable urban development. Critically, with 70 percent of cities worldwide already dealing with the effects of climate change, the urban world is rapidly approaching a new, dynamic and complex future[2]. The limitless potential of youth however, remains ever-present. Where climate change continues to exacerbate urban inequalities and vulnerabilities, a collective and intergenerational solidarity is of paramount importance to accelerate local action. In such unprecedented times, youth

1 This chapter was written by UN-Habitat.

2 United Nations Economic and Social Commission for Asia and the Pacific. Concept Note. Available at: https://www.unescap.org/sites/default/d8files/event-documents/Concept%20Note_Youth-Led%20Digital%20Innovations%20for%20Sustainable%20Development%20and%20Climate%20Action%20in%20Asia%20and%20the%20Pacific%20_1.pdf.

serve as creative innovators and transformative changemakers, possessing bold and ambitious ideas, digital literacy and an unwavering commitment to tackle climate change head-on. As stated by the United Nations Secretary General, Mr António Guterres: "Meaningful, diverse and effective youth participation – inside the United Nations and far beyond – is essential to advancing human rights, addressing the climate crisis and achieving the Sustainable Development Goals".

In an era of global urbanization, metropolitan areas have emerged as the most concentrated and dynamic regions for young innovators to realize change. Young people are open-minded, creative and eager to contribute to the challenges that cities and urban societies face today. They understand that climate change is not only an environmental crisis but also an issue of social justice whereby many have instilled sustainability and climate-conscious attitudes into their fundamental values and behaviours, thus placing them as key actors. They highlight the severity of the situation through climate strikes, public demonstrations, awareness campaigns, and artistic endeavours and expressions. However, young people often remain on the peripheries of local decision-making on climate change and youth-led initiatives tend to be under-resourced and overlooked. In this regard, cities are failing to tap the unique capacities and entrepreneurial spirit of youth, in turn stifling progress on local climate action. By giving youth a seat at the table, their unique knowledge and ideas can offer critical insights to help shape policies and activities, reinforcing the benefit of providing them with opportunities to increase their influence and be acknowledged as important partners in resolving climate issues.

The importance of youth inclusion in climate action is bolstered through international frameworks and commitments such as the United Nations Youth Strategy, the Paris Agreement's emphasis on inclusive climate action as well as the Sustainable Development Goals (SDGs) which support their participation. Youth-led initiatives will aid the facilitation of localizing the global climate goals, recognizing that while climate change is a global issue, effective action starts at the local level. Empowering youth to serve as effective climate leaders is essential to forge a collective impact and deliver climate change solutions. To increase recognition and advance traction among cities and urban actors globally on the need to integrate youth into urban-climate action processes, this 2024 Annual Report draws upon a diverse range of youth-led initiatives on local climate action in addition to broader climate initiatives implemented by cities to advance sustainable urban development. The report thus proposes proactive climate change solutions and in turn encourages green transformations at the local level, recognizing the potential for youth to act as a key driving force for change.

Structure and highlights

Recognizing the urgent need act to foster inclusive approaches on climate action and effectively integrate youth into local processes, the *2024 Annual Report* highlights marked initiatives that are helping to realize this goal among different cities around the world. It presents proactive practices across the key development lenses of international cooperation, economy, society, environment, culture and governance, each of which present a number of practically oriented case studies to serve as model examples to provide inspiration for urban decision makers. In addition, it presents a number of reflexive policy suggestions to support cities in instigating transformative urban change. To acknowledge the acceleration of technology and digitalization and its growing role in sustainable urban development transitions, a dedicated chapter on the role of technology and digital innovation for youth-led climate action considers their potential as catalytic tools to enhance the quality of climate solutions and embed youth participation into local climate action.

The report consists of nine chapters. Following the introduction, chapter two showcases the winners of the Shanghai Award 2024 recognizing outstanding progress and achievements made by cities and municipalities in regard to the implementation of the 2030 Agenda and the New Urban Agenda. Subsequently, six core thematic chapters: (1) international cooperation;

(2) economy; (3) society; (4) environment; (5) culture; and (6) governance, collate best practice case studies. The case studies are compartmentalized into three sub-sections including: (1) the case background which lays out the context and challenges the practice has sought to address; (2)the implementation process which demonstrates the practice delivery process; and (3) reference experiences which serve as translatable knowledge components for urban development practitioners. Each thematic chapter also presents supplementary case study snapshots where boxouts capture notable actions and initiatives plus a set of policy suggestions which draw upon the chapter case studies collectively. The report is concluded by a specialized chapter on technology and digital innovation for youth-led urban climate action.

The best practices of the 2024 Global Award for Sustainable Development in Cities (Shanghai Award) winners

This chapter presents the 2024 Shanghai Award winning cities from the Shanghai Award 2024: Agadir, Morocco; Doha, Qatar; Ixtapalapa, Mexico; Melbourne, Australia; and Trivandrum, India; each of which have made outstanding contributions in global sustainable urban development. The city of Agadir highlights its contribution to building social equity through sustainable water resources management, green infrastructure integration and inclusive urban governance via community action plans. In the city of Doha, the Qatar National Vision 2030 is modernizing urban planning through cutting-edge sustainability and innovation, integrating measures such as green buildings and a state-of-the-art metro system in efforts to become a globally leading climate smart city. The city of Ixtapalapa has undergone a people-centred transformation strategy driven by innovative spatial interventions and social projects that focus on strengthening gender equality, promoting youth development and enhancing the quality of community infrastructure. In the city of Melbourne, the Inclusive Melbourne Strategy is an urban development model that prioritizes equity including measures to tackle homelessness, accelerate impacts. And the city of Trivandrum highlights significant contribution to sustainable urban development through the Kerala Perspective Plan 2030 through which the city is transitioning to a knowledge-based economy under a smart city development model, also integrating intelligent environmental information systems and smart infrastructure.

International cooperation: youth-oriented international collaboration and exchange

Youth hold a key position in supporting climate action at the local level, with often latent potential to drive urban transformation through innovative climate solutions. While prominent international climate organizations are increasing their focus on the concerns and active participation of youth in decision-making, the perspectives of many from marginalized communities, particularly within the global south and developing economies, are still frequently overlooked. Focusing on the role of international cooperation, this chapter highlights the establishment of platforms oriented towards youth from diverse regions and backgrounds as key tools to help exchange knowledge and ideas, and foster problem-solving among young people in global climate action. It discusses elements such as multidimensional youth participation, south-south cooperation, festivals and conferences as well as high-level action undertaken by the United Nations to help develop platforms for youth-led climate action. The chapter aims to encourage young people globally to demonstrate their actions and intent. The first case study highlights multidimensional youth participation in climate governance via collaboration between local government and international organizations in Ho Chi Minh City, Viet Nam, necessitating the importance of youth participation, mobilization and capacity-building to transform individual youth actions into sustained contributions to local climate governance. The second case study showcases the work of the jointly established United Nations Environment Programme (UNEP)-Tongji Institute of Environment for Sustainable Development in addressing global environmental governance through south-south cooperation, initiating capacity-building through technology transfer and policy

implementation. And in the third case study we are introduced to Prajatantra, India's national youth festival, which works to enhance youth participation in local governance and decision-making processes, thus increasing the capacity of young people across municipalities to contribute to local climate action.

Economy: empowering youth to drive green economic development

The transition to green economies is now a fundamental goal shared among cities and local governments in which green innovation and environmentally sustainable economic activity aims to drive forward long-term economic prosperity while supporting environment integrity and regeneration. As a powerful engine for green growth, young people are the new frontier entering green industries and job markets, thus constituting critical actors to innovate within and advance green economic transformations. The symbiotic relationship between green economic development and climate change action therefore go hand in hand whereby the expansion and advancement of green industries is projected to simultaneously enhance the development of climate-oriented technologies and thus facilitate more climate resilient cities. This chapter explores sustainable urban economic strategies as well as the potential for youth to enter green job markets, and perpetuate green growth and climate action through innovative economic activities. The first case study analyses the Separation at Source Programme in Johannesburg which continues to work to promote sustainable waste management in order to mainstream a recycling economy in the city. The second case study draws on the restoration of Cuihu Park, Kunming in China's Yunnan province, highlighting the importance of young researchers and universities in aiding environmental regeneration and eco-tourism as a mutually serving strategy to sustainably capitalize upon the economic benefits of urban parks. The third case study introduces the "Our Garden" project in Rio de Janeiro, in which youth contributions to urban agriculture and community development have worked to unlock economic support for local residents.

Society: youth leading inclusive green urban societies and communities

As integral components of urban life, urban societies operate as core elements making up the primary fabric of cities. Where youth in particular constitute a significant part of urban societies, empowering them to initiative positive change within local communities can help tap their knowledge and unique perspectives, delivering positive transformation within cities and municipalities. A strong commitment to climate action among the younger generations enables young people to influence climate-conscious behavioural change and pivot wider society towards environmentally sustainable actions. Considering these possibilities, this chapter assesses the opportunities that cities possess in capitalizing on young people to catalyse sustainable transformation in line with proactive climate change action at the local level. The first case study demonstrates the impact of low-carbon infrastructure development in the city of Nanning, China in which youth have worked with local communities in old residential communities to employ low-carbon renovation measures in efforts to activate climate-resilient urban renewal. The second case study draws light to the DARAJA project which actively works with local communities and youth within informal settlements in Nairobi and Dar es Salaam, raising awareness and increasing local resilience to climate-induced extreme weather impacts. The third case study highlights Shanghai, China's Changbai Neighbourhood 228, in which young professionals are pioneering the use of low-carbon technologies and sustainable principles to rehabilitate and transform declining communities in the city into vibrant new hubs.

Environment: youth participation in building low-carbon and resilient cities

The development of cutting-edge climate technologies presents cities with key opportunities to test and embed new low-carbon, climate-resilient solutions. While the multi-functional benefits of nature-based solutions and ecological approaches to climate action are well known, their implementation into urban development strategies still lags behind. By

reintegrating nature into urban environments and prioritizing ecological principles in their planning and design, cities can reimagine their futures and operate as high-quality places to live and work. This chapter discusses how cities can integrate innovative ecological based solutions and examines the role of young people in perpetuating sustainable environmental governance. The first case study showcases Liverpool, United Kingdom of Great Britain and Northern Ireland's "URBAN GreenUP", a model test bed initiative for the inclusion of innovative nature-based solutions to address localized climate impacts of stormwater flooding and increased heat stress. The chapter also analyses the transformation of Hong Kong, China's former Anderson Road quarry into a new eco-community, using green infrastructure to deliver state-of-the-art housing and commercial and recreational development. And the third case study captures the value of spatial planning to effectively implement urban greening where the co-location of pocket parks and residential units in Shanghai, China's Xuhui District marks an exemplary model in a land-scarce megacity.

Culture: youth-driven low-carbon culture and environmental innovation

Culture plays an integral role in moulding low-carbon values with significant potential to bridge global climate goals with localized solutions to accelerate climate action by promoting sustainable behaviours. As key agents of change, youth can combine low-carbon behaviours with modern communication strategies to enhance public awareness and meaningfully influence local action on climate change. This chapter examines the potential for young people to promote "green" culture within urban societies by: using diverse forms of cultural and artistic expressions to illustrate the importance of climate action; spearheading new narratives towards sustainable development; and leveraging culture as a means to engage more people in climate change. It also explores the capacity for young individuals to merge traditional and contemporary knowledge to facilitate intergenerational participation in climate initiatives to mainstream the realization of green culture in urban life. The first case study presents the Fashion for Good initiative in Amsterdam, working to engage youth in low-carbon fashion and promote industry sustainable practices to support environmental sustainability. The second case study highlights the Cultural H.ID.RA.N.T project in which the municipality of Chalandri, Greece is leveraging historic water resources to instigate heritage-led regeneration as part of a blue-green urban revitalization plan. And the third case study showcases the Luxelakes Park Community in Chengdu, China which has consciously integrated natural ecosystems into urban life where a community foundation has empowered youth to advance local ecological conservation and ensure environmental stewardship in line with sustainable urban development.

Governance: youth-oriented urban and community co-governance platforms

Inclusive and equitable urban governance is essential to evenly distribute decision-making power at the local level and effectively integrate youth into local action processes. Inclusive urban policies and accessible urban management platforms are instrumental in removing barriers to youth participation, and as such serve as important measures to ensure good governance. Cities are encouraged to support and nurture youth-led leadership in climate change projects to harness the full capacity of young people in driving positive environment change. This chapter highlights several municipal strategies from the perspectives of data, political and citizen participation, and climate governance aiming to empower youth in local climate action. The first case study presents the Buenos Aires Climate Action platform, an open-data digital platform facilitating a citizen-centric approach to urban governance in which information on climate change is freely accessible. The chapter also analyses Lima's Youth Action initiative through which the city has worked to expand the rights of urban youth in political and citizen participation in local governance. And the third case study highlights an innovative example of a youth-led ecosystem-services based approach to climate action in Mombasa, Kenya through the youth-founded community-based organization Big Ship, which has facilitated mangrove ecosystem protection and rehabilitation as a strategy for climate change adaptation.

Technological and digital innovation for youth-led climate action

Chapter eight analyses the capacity for technology and digital tools to drive youth-led urban climate action. It investigates the opportunities that green and smart digital technologies present to cities to take decisive action on climate change, as well as the potential for young people to capitalize on this technology to generate new climate solutions and perpetuate climate-sensitive urban development. The chapter also highlights the importance of education and training to enable younger generations to effectively leverage new technological and digital innovations to instigate effective climate action, as well as the value of creating enabling environments that encourage green entrepreneurship at the local level. Acknowledging the gap between cities and young people, it further explores the value and role of digital platforms and networks as a means to empower youth, and integrate them into municipal level decision-making.

Case selection and principles

The case studies highlighted within this *2024 Annual Report* exemplify excellence in regard to enhancing local climate action and therefore sustainable urban development within their respective thematic domain. Cases were selected on the basis of six main criteria: (1) their recognition as best practices; (2) their use of innovation; (3) their commitment to driving climate action, particularly in respect to integrating youth into local climate action processes; (4) their contribution towards achieving climate-resilient and environmentally sustainable cities and communities; (5) their ability to be replicated and scaled up across urban contexts; (6) their overall impact on climate action, see Table 1.1.

Table 1.1 Case study selection criteria

Criteria	Description
Recognizable	Case studies are seen to have made outstanding contributions to sustainable urban development within their respective thematic domain, in which actions are reinforced with data-driven evidence to ensure credibility to the achievement. Case studies are therefore widely recognized as best practices by the international community, for example: winning prizes via authoritative organizations or prestigious awards programmes; being recommended by official websites or publications; or having been critiqued by international journals (for ongoing projects this requirement is not mandatory)
Innovative	Where climate change is presenting more complex challenges to urban areas, local innovation is increasingly critical to progress climate action and sustainable urbanization. Case studies demonstrate innovative approaches in their respective contribution to youth-led climate and local action, and therefore sustainable urban development. Innovations across planning, design, policy and governance spheres may include but are not limited to: infrastructure development; urban management strategies; physical planning and design; technological, digital and social innovations, as well as community engagement and cooperation methods; policy approaches; and partnership building across respective thematic dimensions
Sustainable	Case studies integrate principles contributing to sustainable urbanization within their respective thematic dimension supporting regenerative and sensitive urban development strategies. Case studies thus contribute to the global knowledge repository of model city practices that help drive sustainable urbanization in line with the overall theme of the report
Inclusive	Case studies contribute to inclusive urban development, for example, via the incorporation and consideration of gender, age and/or under-represented/marginalized groups in regard to decision-making and actions. Cases actively facilitate social and gender equality, therefore increasing equity and inclusivity for marginalized urban inhabitants
Replicable	Case studies demonstrate initiatives/strategies/models that can be replicated in different urban contexts such as different physical scales, populations, environments and cultures. In this regard, replicability may be demonstrated through scalability and transferability to diverse geographical or cultural urban settings, or ease of implementation in other cities and municipalities
Contemporary	Case studies demonstrate impact on their respective domains within the last five years as exemplified through data or direct experiences. The implementation process of the practices may occur over a number of years before their results were delivered, however, cases should ultimately be up to date in regard to their positive impact and experience

Towards proactive city solutions for youth integration into climate and local action

As prominent players at the forefront of climate action, cities are tasked to generate new solutions to harness the vitality and insights of young people to capture their unique perspectives on climate change. Many young people around the world are acutely aware of climate issues, and thus hold a key role in advancing local climate governance, yet their full potential for impact remains untapped. While climate impacts increase in complexity and intensity, cities must act with urgency to adequately position young people to lead the way in shaping the future of urbanization. Where young people have built extensive global climate action networks operating to mobilize and initiate strategic climate action, this reiterates the importance of implementing inclusive approaches to further empower youth in climate processes. This *2024 Annual Report* highlights a broad range of impactful solutions applied by cities and communities to enhance the capacity for action and impact of youth in local level action.

International cooperation reflects a core mechanism by which to amplify the voices and impact of youth in climate and local action across all regions of the world. Via inclusive modes of collaboration, cities have the ability to promote youth inclusion through means such as national and international city-to-city dialogue and exchange, international negotiations, climate processes as well as tools such as social media platforms to enhance the representation and visibility of young people. Targeted multi-level and multi-sector capacity building programmes have the bandwidth to support cities in better empowering youth climate action at the local level whereby means such as climate skills training, academic exchange, internships and employment can onboard youth into the core of climate change processes. By supporting the mobilization of young people as proactive and agile actors in climate change spheres, cities can benefit from the innovation and ideas that they create.

The integration of youth into the green economy also marks a pivotal measure for cities to scale up sustainable industries and catalyse climate resilient economies. As the younger generations enter the workforce, young people are in pole position to accelerate green jobs and enhance climate-oriented economies and local economic development. Government funding, technical training and supportive policy equally serve as critical tools to incentivize youth-led initiatives across areas such as renewable energy, green technologies and research on green growth, in turn strengthening urban economic prosperity. The development and expansion of green job markets represents a significant opportunity for cities to achieve green transitions in which circular economy models offer municipalities the opportunity to drive long-term economic growth while minimizing detrimental environmental impacts. By facilitating channels that enable youth participation in circular economy models, cities can cultivate a new generation of committed leaders striving for ecologically sensitive economic development.

Comprising a fundamental layer of urban systems, cities can capitalize on the collective power of urban societies to drive impactful local action on climate change. Where diverse community members, in particular youth, serve as powerful agents of change, cities are incentivized to leverage their knowledge, innovation and ideas. Youth-focused programmes along with mechanisms such as public-private partnerships and focused engagement with enterprises, foundations and social organizations can support climate change projects at the grassroots level, and hence tap the collective knowledge of independent youth and local community members, empowering citizen participation in local action. Youth integration into community service delivery, for example in disaster risk reduction efforts, is also increasingly pertinent to cultivate more resilient urban societies, serving as key agents to increase awareness on acute climate impacts and consequently, risk perception and local adaptive capacity. Where youth leaders can mobilize local efforts to prepare for climate change, they can foster improved social cohesion, contributing to the long-term sustainability of communities.

In recognition of the need to harmonize urban development with nature, a shift from grey to green infrastructure integration further constitutes a vital opportunity to achieve green, climate-resilient urbanization. Nature-based solutions can help cities to embed long-term sustainability efforts into development plans, functioning as climate adaptation tools that reduce pollution and disaster risks, and also enhance biodiversity and ecology, increasing urban environments and thus quality of life for citizens. As urbanization accelerates in many global regions, land use optimization also remains integral, in which sustainable approaches to spatial planning and multi-use design can maximize land use efficiency and support ecological quality. As a primary infrastructural element at the forefront of sustainable urbanization, multifunctional urban green space development offers cities invaluable benefits as both a climate change resilience component and a means by which to create high-quality public space. As young people advocate for long-term environmental sustainability and present innovative new ideas, inclusive urban policies will enable cities and local governments to garner the input of youth to help shape the sustainability and functionality of future urban environments.

Whilst still not yet fully realised, connections between local cultural elements and climate change in cities are of considerable importance in influencing local climate action. Culture plays an important role in creating climate narratives that resonate with local communities whereby historic cultural practices often intersect with environmental challenges and can be used to create long-term solutions. As often overlooked assets, both tangible and intangible cultural heritage offers cities unique tools to adapt to climate challenges. Infrastructure such as historic water management systems can be integrated into modern climate change strategies where traditional knowledge and building practices can blend with modern engineering to aid sustainability and resilience-building efforts within the urban fabric. Cities can capitalize upon their own cultural heritage as informative tools to educate younger generations about climate change and resilience, therefore serving as invaluable assets to drive local climate action. Scaling up opportunities for youth to learn and acquire green skills can further accelerate climate action and create shifts in cultural attitudes through fostering new approaches among the younger generations. The development of platforms for innovation and cooperation on climate action, as well as initiatives such as green skills exchange systems, can support young professionals to integrate climate-oriented practices within both their work and everyday lives. Through digital media and community projects, youth can promote climate resilience by blending cultural preservation with climate efforts in which initiatives such as green community renewal and cultural festivals have the capacity to raise environmental awareness, inspiring young people to take active roles in low-carbon living and climate action.

Transforming cities must also work to change urban governance to empower young people as local climate leaders. The integration of dedicated youth participation mechanisms in local governance will help cities to fully leverage their potential as climate change-makers. Inclusive governance structures such as youth councils, participatory budgeting and advisory committees allow young people to actively engage in decision-making processes and ensure their voices are heard in shaping climate policies. By integrating youth into local governance, cities can leverage their innovation, energy and digital literacy to drive sustainable solutions from community-based adaptation projects to ecosystem monitoring. Such a transition will not only amplify youth leadership but also foster stronger community involvement to create more resilient governance models. For example, youth-led non-governmental organizations (NGOs) alongside community-based initiatives, can guide public engagement in environmental conservation while creating employment opportunities for youth through technical training and network support. Cities can also enhance access to mentorship and workshops providing practical experience in urban governance; while bolstering support for youth-led ecological projects via targeted funding, open data policies and collaboration with private enterprises can foster greater innovation to drive impactful local action on climate change.

As urban centres face mounting pressure to decarbonize and advance local climate initiatives, a further opportunity lies in the synergy between

green and smart digital technologies. This integration fosters a transformative urban transition in which green technologies enable cities to pursue net-zero emissions, while smart technologies such as big data, artificial intelligence (AI) and digital twins, enhance the efficiency and impact of these green interventions. Smart technologies offer targeted solutions for improving energy use, monitoring air quality and managing resources, though they also introduce new risks and dependencies. To harness these benefits, it is crucial to build secure and adaptable urban systems. Young people are pivotal in advancing and applying these technologies, however, they need quality education and accessible pathways into green careers to fully contribute. Accordingly, cities must prioritize inclusive education, digital literacy and supportive environments for youth innovation to leverage their potential in climate action. Effective collaboration among youth, local governments and other stakeholders will ensure that climate solutions are inclusive and impactful, aligning urban strategies with technological advancements and fostering a citizen-centred approach to addressing the climate crisis.

Chapter 2

The best practices of the Global Award for Sustainable Development in Cities (Shanghai Award) 2024 winning cities

Introduction[1]

This chapter summarizes the best practices of the five winning cities of the Global Award for Sustainable Development in Cities (Shanghai Award) 2024. The Shanghai Award was officially launched by the Executive Director of the United Nations Settlement Programme (UN-Habitat) at the first session of the 2022 Executive Board of UN-Habitat on 30 March 2022. The award is a global initiative led by UN-Habitat and the Shanghai Municipality, aiming to accelerate the implementation of the 2030 Agenda and New Urban Agenda. It focuses on advancing SDG 11 and promoting SDG localization, echoing the Global Development Initiative and incentivizing cities to find systematic solutions for sustainable urban development. In addition, the award helps to build the platform for advancing UN-Habitat's strategic plan and flagship programmes, and the Global Urban Monitoring Framework.

The theme of this second cycle of the award is "Building a sustainable urban future for all", to recognize cities that have made significant progress in the four areas of: quality and secure housing for diversified needs; youth leading vibrant communities; innovative development for urban prosperity; and capacity building for sustainable urban development. A total of 55 cities in 28 countries across 5 continents submitted applications. In accordance with the evaluation criteria whilst also considering the representation, growth potential and demonstrated impact of submissions, an international jury selected five winning cities. These cities have all achieved a series of integrated, sustainable urban solutions and impactful practices involving broad multi-stakeholder participation.

Agadir, Morocco: The city has made great efforts in sustainable water management and has achieved notable progress in green infrastructure development. By engaging citizens in urban governance through community action plans, Agadir fosters social equity while advancing sustainable development.

Doha, Qatar: Amid rapid economic growth and urbanization, Doha has achieved its sustainable development goals through a series of policies and action plans, striving to become an international hub for high-quality education, high-end business, and scientific research.

Iztapalapa, Mexico: Iztapalapa has undergone a sustainable urban transformation, ensuring that the human rights of all its citizens are fully respected and protected.

Melbourne, Australia: As a city brimming with opportunities, Melbourne places fairness and inclusion at the heart of its initiatives, ensuring that no one is left behind in the pursuit of sustainable development goals.

Thiruvananthapuram, India: Through its smart city action plan, Thiruvananthapuram has driven the development of green transportation and smart infrastructure, as well as the utilization of renewable energy, establishing itself as a model for an environmentally friendly, socially inclusive and sustainable city.

1 This chapter was compiled from the 2024 Shanghai Award application documents. The authors are: Wang Xin, others to be added from Tongji University. Figures and images are sourced from the application material; location maps in were drawn based on Google Maps screenshots.

Agadir, Morocco

Overview

Agadir is advancing in urban modernization and sustainable development through a range of innovative initiatives. Confronted with limitations related to land and water resources, the city has launched a Communal Action Plan offering strategic solutions to these challenges. Specific measures include the implementation of LED lighting systems, sustainable water management practices, the introduction of a Bus Rapid Transit system and the establishment of inclusive governance mechanisms — all aimed at improving energy efficiency, optimizing water usage and expanding green spaces. Agadir also places a significant focus on preserving its urban identity amidst cultural shifts through proactive cultural engagement programmes. The Virtual City project, utilizing digital twin technology, stands as an exemplar of how technology can enhance municipal management and foster citizen participation. These initiatives align with global sustainable development goals, positioning Agadir as a replicable model for other cities aiming to achieve similar progress (Figure 2.1).

Figure 2.1 Agadir cityscape

Development context

1. Context

Agadir is a prominent centre of Amazigh culture and is often referred to as the "Gateway to Africa" due to its strategic geographical location. The city's economy is primarily supported by tourism, port activities and agriculture, bolstered by active industrial and service sectors. With its favourable climate and strategic coastal setting, Agadir has established itself as a premier seaside resort, drawing numerous visitors throughout the year. To further its goals of modernization and sustainable development, Agadir has engaged in several key initiatives, such as the advancement of green infrastructure, the adoption of smart urban governance and the enhancement of public transportation systems (Figure 2.2, Table 2.1).

2. Main challenges encountered

Agadir's growth is challenged by unique geographical constraints, including natural boundaries formed by

Table 2.1 Key urban data of Agadir

No.	Indicator	Data	Notes
1	Permanent population (2023)	42,028.8	
2	Administrative area	8,573 km^2	
3	Built-up area	40 km^2	
4	GDP per capita (2023)	USD 3,806	

Figure 2.2 Agadir's location

the ocean and surrounding mountains, which exert substantial pressure on land availability. Additionally, the city is vulnerable to natural hazards, particularly earthquakes and water shortages, highlighting the necessity for strengthened disaster preparedness and sustainable resource management. Agadir's rich biodiversity — including species such as the Moroccan argan tree and the endangered migratory northern bald ibis bird — requires concerted conservation efforts, adding another layer of complexity to the city's urban planning. In response, Agadir has actively implemented its Communal Action Plan alongside the Urban Development Plan. These initiatives are focused on reinforcing infrastructure, enhancing disaster resilience and advancing environmental conservation measures to ensure sustainable urban growth (Figure 2.3).

Source: https://agadir.ma/en/projects/anza-green-space/

Figure 2.3 Anza Green Space Coastal Park Project

Sustainable development strategies

1. Overall strategy

Agadir's Communal Action Plan envisions the city as a dynamic, open and modern metropolis that stands as a beacon for sustainable and smart urban transformation. This vision aligns closely with the SDGs and the New Urban Agenda, ensuring that the city's initiatives promote sustainability across

social, economic and environmental dimensions. To fund these transformative programmes, Agadir has successfully raised MAD 1 billion through municipal bonds, demonstrating the city's commitment to long-term urban development (Figure 2.4).

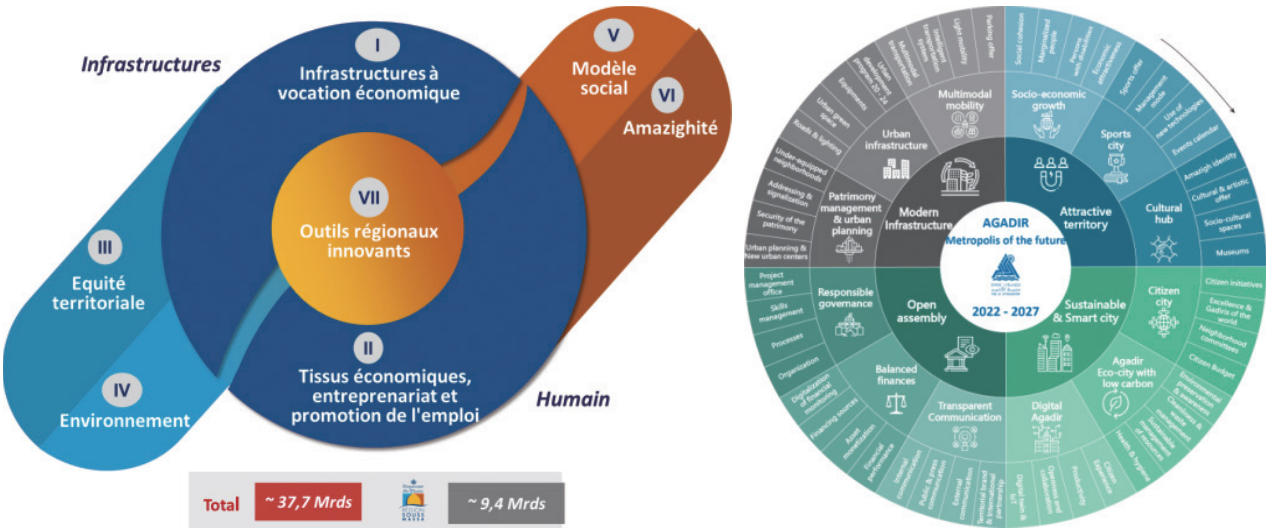


Figure 2.4 Investment allocation priorities and future development goals of Agadir's Communal Action Plan

2. Action strategy

The Communal Action Plan outlines targeted actions aimed at improving urban mobility, expanding green spaces and modernizing public services through digital platforms. To monitor progress, the plan includes key performance indicators allowing city leaders to assess developments in areas such as public service access, air quality and citizen participation in municipal governance.

The Communal Action Plan's alignment with the SDGs is exemplified by the following strategic priorities:

(1) Attractive urban zones: fostering economic diversification, cultural vibrancy and modern sports infrastructure to boost both local and international tourism while ensuring an average of 8 m^2 of green space per person.

(2) Smart city development: leveraging digital technologies and sustainable practices in urban management, including the creation of an integrated urban monitoring system.

(3) Resilient infrastructure: enhancing infrastructure, especially in urban transportation, by expanding the city's multi-modal transport network.

(4) Transparency and community engagement: encouraging participatory decision-making to ensure diverse community voices are represented in the city's planning and governance processes.

Feature activities

Action 1: Agadir's LED lighting initiative

Agadir is modernizing its infrastructure through the implementation of a smart LED public lighting project which has seen the installation of over 6,000 lighting points across the city. This initiative is aligned with SDG energy conservation goals and introduces two key innovations: a smart network enabling remote control of public lighting for better energy efficiency; and a future-proof design that allows for technological upgrades to each streetlight, transforming them into smart lighting and sensor nodes without requiring replacement. As of 2023, 25 percent of Agadir's lighting infrastructure has been

upgraded with full conversion expected by 2026. Despite ongoing urban expansion, Agadir reduced its energy costs by 8 percent in 2023, underscoring the project's efficiency (Figure 2.5).

Figure 2.5 Agadir's smart LED public lighting system

Action 2: Agadir's sustainable water management initiative

Agadir faces significant challenges in managing its water resources. With rapid urban expansion the demand for water has sharply increased, while groundwater levels and quality have continuously declined exacerbating shortages of drinking water. Prolonged droughts in recent years have further compounded these issues. In response, Agadir has adopted a comprehensive strategy to utilize treated wastewater for the irrigation of public spaces, structured around three core measures. Firstly, the city has upgraded its wastewater treatment facilities, ensuring that treated wastewater meets rigorous irrigation standards with an emphasis on environmental protection and sustainability. Secondly,

it has expanded the infrastructure for wastewater reuse, allowing more public spaces— including parks, gardens and major urban roads— to be irrigated with treated water, reducing reliance on potable water. Thirdly, Agadir has integrated the use of treated wastewater into its urban landscape planning, embedding sustainable practices into the city's development and maintenance processes. This strategic initiative has delivered impressive outcomes. Between 2022 and 2023, Agadir reduced its groundwater usage by 70 percent, generating annual savings of MAD 1 million. In addition, the volume of treated wastewater used for irrigation rose from 263,065 m^3 in 2022 to 656,936 m^3 in 2023, underscoring the city's effective resource management and commitment to sustainability.

Action 3: Agadir's sustainable greening strategy

Since 2020, Agadir has been implementing a sustainable greening strategy aimed at increasing urban green space from less than 2 m^2 per person to 8 m^2 per person. This is part of Agadir's long-term vision to create a sustainable and resilient urban environment, enhancing the quality of life for all residents. Significant achievements include the development of key parks such as Olhao, Ibn Zaydoun, Lalla Meryem and Abderrahman Yousfi, which collectively serve as social and recreational hubs for the community. As of 2023, the total green space in Agadir has grown to 1.75 million m^2, increasing per capita green space to 3.5 m^2. Local nurseries have also cultivated over 122,000 plants and shrubs, further contributing to the city's greening efforts (Figure 2.6).

Agadir is developing a network of green corridors that connect parks and green spaces to promote biodiversity and enhance ecological connectivity. These corridors incorporate sustainable features that help reduce the city's carbon footprint and increase climate resilience. Agadir plans further expansions and improvements to its urban green spaces in preparation for hosting major international events such as the 2025 Africa Cup of Nations and the 2030 FIFA World Cup (Figure 2.7).

Figure 2.6 Urban greening of Agadir

Figure 2.7 Green corridor network of Agadir

Main achievements

1. Impacts

(1) High-quality, safe housing for diverse needs

Through the Urban Planning Scheme, Agadir effectively addresses the diverse housing needs of its residents by providing high-quality, safe and accessible options. Emphasizing sustainability, new developments are constructed in compliance with green building standards, ensuring integration with green spaces, public transportation and essential social services. The scheme also focuses on upgrading underdeveloped neighbourhoods, enhancing infrastructure such as road networks and public amenities to create well-organized, visually appealing communities. Agadir remains proactive in updating its planning strategies to adapt to demographic shifts, environmental changes and technological advancements.

(2) Youth-driven vibrant communities

Agadir emphasizes youth participation in urban planning, governance, cultural activities and sports, enabling young people to play an active role in shaping a sustainable and dynamic urban environment. The city encourages youth involvement in developing the Community Action Plan through regular workshops and consultation meetings, ensuring their perspectives are represented. Agadir also empowers youth through engagement in festivals, art events and sports programmes, offering a platform to showcase talents and foster community spirit. Educational workshops are also conducted to raise awareness on environmental sustainability, civic responsibility and social inclusion, while support is provided for youth-led projects to enhance social welfare and community resilience.

(3) Driving urban prosperity through innovation

Agadir has pioneered several innovative initiatives to drive urban prosperity and enhance residents' well-being. For instance, the Digital Agadir project established a central digital platform, the City Super Monitor, enhancing the delivery and efficiency of municipal services, thus positioning the city as a leader in regional smart city development. Additionally, the construction of rapid transit lines has improved the multimodal transport network, complemented by new bike lanes and pedestrian pathways to encourage non-motorized mobility (Figure 2.8).

2. Sustainability

(1) Long-term urban development strategy

Agadir's Community Action Plan serves as the foundation for its comprehensive growth, embodying a long-term strategy rooted in sustainable development principles. Aligned with the 2030 Agenda for Sustainable Development and the New Urban Agenda, the plan promotes economic diversification beyond tourism, fostering growth in technology, renewable energy and sustainable agriculture to enhance job opportunities and economic resilience. Infrastructure development focuses on inclusivity and green building standards, promoting urban livability and resilience. The plan's objectives are well-aligned with

Figure 2.8 Digital transportation system of Agadir

sustainability standards and contribute to the city's holistic growth.

(2) Human-centred approach

Adopting a people-first approach, Agadir's Community Action Plan is committed to inclusivity under the guiding principle of Leave No One Behind. The city ensures participatory urban planning, incorporating input from all community members. Social cohesion initiatives such as building facilities for marginalized groups (e.g., day-care centres, community hubs), are aimed at fostering intergenerational and cross-cultural connections. Economic inclusion is promoted through employment opportunities, vocational training and support for vulnerable groups. Accessible public spaces have also been designed to guarantee equal participation in urban life for all citizens.

(3) Financing and investment mechanisms

Agadir's robust financial strategy underpins its long-term urban development and sustainability goals. The framework enhances financial stability, enabling the city to fund key infrastructure and community projects effectively. To diversify funding and reduce reliance on traditional sources, Agadir successfully issued Morocco's first municipal bond, securing MAD 1 billion to support its urban development objectives.

Learning aspects

1. Innovation

(1) Policy and legislative innovation
Agadir has implemented a policy to use treated wastewater for irrigating public green spaces, while prohibiting the use of well water for such purposes. This measure effectively addresses water shortages in the city's semi-arid environment, conserving valuable freshwater resources and promoting the reuse of treated water. The policy has been successfully applied citywide and serves as a model for urban water management in other semi-arid regions.

(2) Innovative planning and design
The city's urban planning practices are distinguished by their innovative approaches, particularly the development of green corridors. These corridors go beyond traditional urban greening as they are designed to address multiple challenges including flood risk mitigation, the urban heat island effect, and diverse social, economic and environmental needs, representing a significant breakthrough in urban landscape design.

(3) Innovative governance models
Agadir has leveraged digital technology to enhance governance, improve citizen participation and increase transparency. The city's digital platform integrates various municipal functions, offering real-time public access to data and operations. This streamlined approach also improves feedback mechanisms, boosting the city's capacity to respond to public concerns and enhancing operational efficiency.

2. Adaptability

Agadir's urban strategies offer adaptable models for other cities facing similar challenges. By focusing on sustainability, inclusiveness and efficiency, these strategies can be customized to address the unique resources and urbanization issues of different cities.

(1) Sustainable water management
Cities in arid or semi-arid regions can evaluate their water treatment capacities and adopt Agadir's wastewater irrigation system for sustainable resource management.

(2) Digital twin technology in urban management
Agadir's application of digital twin technology in municipal management can be a reference for other cities aiming to improve operational efficiency in public services.

(3) Green urban infrastructure
Transforming degraded or underutilized spaces such as dry riverbeds into multifunctional green corridors is a strategy adaptable for cities looking to enhance biodiversity, manage flooding and create recreational areas.

(4) Participatory urban planning
Agadir's community-driven approach to urban planning is particularly relevant for cities dealing with social inclusion challenges or rapid demographic shifts, ensuring development aligns closely with local needs and aspirations.

Doha, Qatar

Overview

Doha, the capital of Qatar, is home to more than one-third of the nation's population. As the city experiences rapid economic growth and urbanization, Qatar has adopted comprehensive long-term development strategies including the Qatar National Vision 2030 (QNV2030), the National Development Strategy and the Qatar National Master Plan (QNMP). Guided by the QNV2030 framework, Doha has transformed from a small community once reliant on pearl harvesting into a global model of sustainable development and innovation. The city is dedicated to reducing its environmental impact through initiatives such as green building practices and the development of the Doha Metro. Doha's achievements in sustainability also reflect its deep respect for cultural heritage, efforts to diversify its economy and commitment to ensuring a high quality of life for its citizens. Doha's

evolution exemplifies how urban areas worldwide can balance the preservation of tradition with forward-thinking innovation to shape a future-oriented cityscape (Figure 2.9).

Figure 2.9 Doha cityscape

Development context

1. Context

As Qatar's capital, Doha has witnessed significant population growth, increasing from 300,000 residents in 2001 to approximately 1.2 million today. The city's demographic composition is distinct with males comprising around 74 percent of the population and non-Qatari residents accounting for 88 percent, reflecting its rich multicultural fabric. Doha's desert climate and strategic location along the Arabian Gulf afford it unique natural resources, which offer both recreational opportunities and vast potential for economic growth. These advantages have attracted numerous international corporations and financial institutions, establishing Doha as the financial and economic hub of the country (Figure 2.10, Table 2.2).

Table 2.2 Key urban data of Doha

No.	Indicator	Data	Notes
1	Permanent population (2023)	118,600	Based on 2020 data
2	Administrative area	221.17 km²	
3	Built-up area	–	
4	GDP per capita (2023)	USD 78,700	

Figure 2.10 Doha's location

2. Main challenges encountered

Like many rapidly expanding cities, Doha faces several challenges including the need to balance modernization with the preservation of its cultural heritage, while addressing both current and future urban needs. It is also essential for Doha to manage controlled urban growth to prevent sprawl. The city must find a delicate balance between economic development, social progress and environmental sustainability. Doha also experiences environmental challenges such as its arid climate, rising sea levels and limited water resources.

Sustainable development strategies

1. Overall strategy

Doha's sustainable development strategy is closely aligned with Qatar's national development framework. To address the challenges posed by rapid economic expansion and urbanization, the Qatari government has introduced a series of policies rooted in QNV2030, the National Development Strategy and QNMP. These policies offer a comprehensive, long-term vision for growth, adhering to international policy frameworks such as the SDGs and the New Urban Agenda. The Qatar National Development Framework (QNDF), along with the Municipal Spatial Development Plans and Area Action Plans, forms the planning system that guides Doha's development. QNDF serves as the foundational structure prioritizing four core pillars: human development; social development; economic development; and environmental sustainability. This holistic approach is designed to ensure that Doha's growth remains sustainable and aligned with the country's long-term vision (Figure 2.11).

Figure 2.11 Third Qatar National Development Strategy 2024—2030

2. Action strategy

QNDF outlines 60 policies and 211 actions across 6 critical sectors: economic prosperity; community life; the natural environment; the built environment; transportation; and public utilities. These policies are firmly grounded in sustainable development principles and are designed to address Doha's urban challenges. Key actions include climate change mitigation and coastal management plans aimed at combating rising sea levels and environmental degradation. In the social sector, a national housing strategy is being implemented to address affordable housing shortages, while the open space and recreational facilities strategy focuses on creating leisure and cultural spaces, balanced with environmental protection measures. Urban growth management is further supported by the introduction of boundaries and green belts to control urban sprawl, while mixed-use, high-density, transit-oriented developments are encouraged to enhance walkability and increase the use of public transport. Doha's master plan proposes strategies to alleviate traffic congestion, streamline maritime facilities and shift towards more sustainable transportation modes including urban buses and the metro system. To support this, green transportation solutions and policies for integrated, efficient urban mobility are prioritized. An update to the Qatar National Development Framework is scheduled for next year, incorporating urban observatories to monitor and evaluate Doha's sustainability progress, ensuring continuous improvement in line with the city's long-term goals.

Feature activities

Action 1: Youth-driven vibrant communities (2018—2032)

Doha is fostering a dynamic urban environment by encouraging flexible use of public spaces, particularly through initiatives led by youth. This approach enhances the city's vibrancy and livability, aligning with national goals for inclusive urban development. Under supportive policies, several urban areas have been temporarily transformed to host youth-led cultural and creative enterprises. For example, the Al-Duhail Sports Club parking area has been repurposed as a "youth market", offering young entrepreneurs a platform to operate stalls and night markets. Additionally, public spaces connected to the metro system have been utilized for winter festivals featuring diverse cultural and commercial activities. The Al-Najada project, which restored 17 historic buildings, provides local artists and entrepreneurs with spaces to sell traditional products and artworks, contributing to Doha's cultural and economic vitality (Figure 2.12).

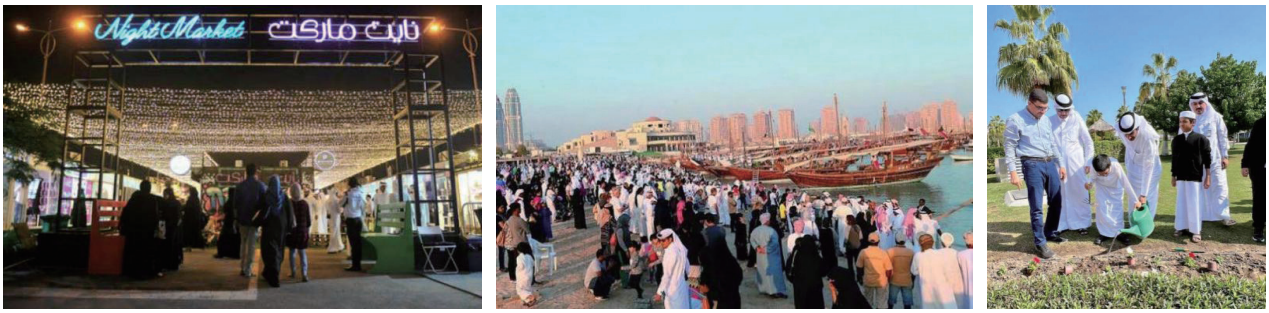


Figure 2.12 Young entrepreneurs utilize Doha's urban spaces to develop cultural and creative industries

Action 2: Qatar National Housing Strategy (2020—2035)

The Qatar National Housing Strategy sets out a comprehensive vision for sustainable, high-quality housing that meets the diverse needs of the population while preserving natural and historic environments. The strategy emphasizes affordability and inclusivity by establishing policies that ensure access to housing for all community groups. Key initiatives include the allocation of 10 percent of new housing developments

for affordable units and a minimum 10-year resale restriction on these units to maintain long-term affordability. In terms of urban planning, the strategy sets ambitious goals for proximity to public transport, where 40 percent of residential units should be located within 800 m of transit stops within 5 years, and this figure is projected to increase to 60 percent within 10 years. Special provisions have also been made for workers in sectors such as construction and infrastructure, addressing their housing needs in a way that supports both economic growth and social equity.

Action 3: Qatar 2050 Transport Master Plan

The Qatar 2050 Transport Master Plan prioritizes the development of sustainable, non-motorized modes of transport, such as walking, cycling and micro-mobility, to alleviate traffic congestion and reduce pollution. Central to this plan is the expansion and enhancement of Doha's public transportation system, with a focus on the metro and the gradual introduction of rapid bus routes. This integrated transport network includes metro lines, buses, taxis, rapid buses, trams, long-distance rail and water taxis (Figure 2.13).

Figure 2.13 Doha's public transportation system

The Doha Metro, electric bus network and cycling infrastructure form the three key pillars of this vision. The metro is internationally recognized as the world's first metro system to achieve sustainability certification, establishing a global benchmark for urban transport projects. Similarly, the electric bus network showcases Doha's dedication to green transport solutions, featuring a fleet of advanced, eco-friendly buses. The city's cycling infrastructure is highlighted by the world's longest continuous cycling path, stretching 32.869 km, and is a safe and accessible route for cyclists.

Action 4: Msheireb Downtown Doha

The Msheireb Downtown Doha (MDD) initiative has gained global recognition as the first fully constructed smart and sustainable city district. MDD offers a mix of residential, commercial and cultural facilities, including retail spaces, business services and visitor spaces for example, museums. The district incorporates cutting-edge sustainable practices, such as green building designs, intelligent lighting systems, water conservation technologies and sustainable transportation options. It also features an advanced waste management system that has contributed to a 30 percent reduction in overall energy consumption. MDD has further advanced sustainability through the installation of 6,400 rooftop battery units and 1,400 solar panels generating 1,400 megawatts of electricity annually. By partnering with Microsoft, the district leverages cloud computing, AI and big data analytics to improve community welfare (Figure 2.14).

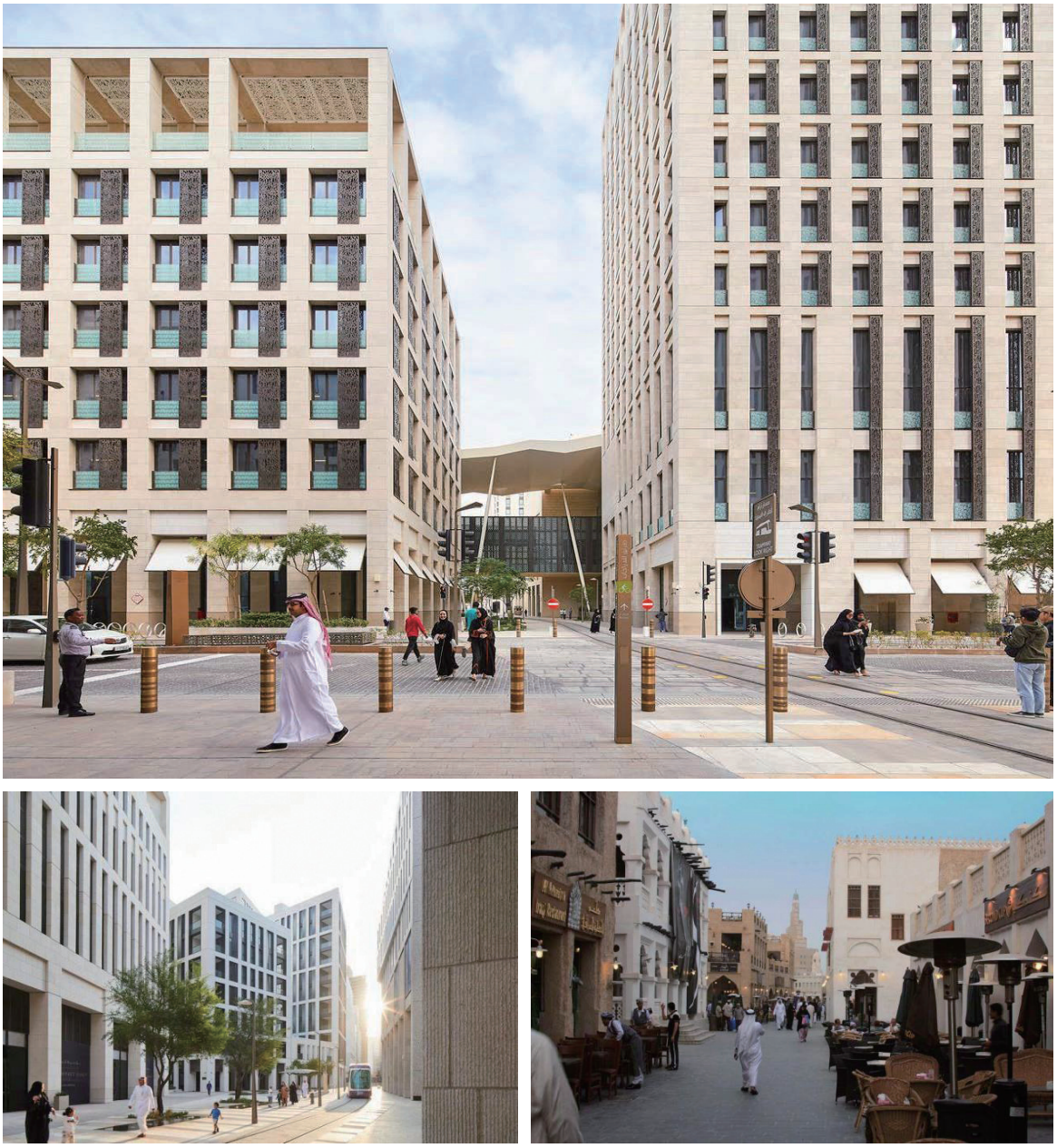


Figure 2.14 Msheireb Downtown Doha (MDD) initiative

Main achievements

1. Impact

(1) Social impact

Doha's commitment to sustainable urban development has led to significant social benefits contributing to enhanced well-being, economic diversification and cultural heritage preservation. These efforts are fostering a more inclusive and innovative society. The National Housing Strategy has made progress in improving housing accessibility, affordability and sustainability, and reforms in labour housing standards demonstrate a firm dedication to social equity. Strategic reuse of urban spaces and the restoration of historic buildings have propelled the growth of the creative economy, particularly empowering young talent by providing platforms for skill display and entrepreneurship. Urban renewal efforts, exemplified by the MDD project, showcase the role of technology and smart urban planning in effectively reducing energy consumption (Figure 2.15).

Source: https://www.constructionweekonline.com/projects-tenders/msheireb-downtown-doha-awarded-guinness-world-record-largest-underground-car-park

Figure 2.15 Msheireb Downtown Doha awarded Guinness World Record for world's 'Largest Underground Car Park

(2) Environmental impact

Doha's sustainable development initiatives have generated positive environmental outcomes in several domains. Firstly, comprehensive upgrades to the public transportation system have significantly reduced the city's carbon footprint. Secondly, the development of pedestrian- and cyclist-friendly infrastructure promotes low-carbon mobility, reduces energy consumption, and enhances the urban ecosystem. Thirdly, Doha has tackled waste management challenges through integrated infrastructure and public-private partnerships. The Zero Waste campaign, under the motto Less Waste, More Beautiful City, advances sustainability by reducing waste, encouraging recycling and raising public awareness, contributing to the goal of achieving a sustainable city by 2030.

2. Sustainability

(1) Long-term urban development strategy

The Qatar National Development Framework outlines 17 strategic planning objectives to foster sustainable development and establish a high-quality urban lifestyle. For Doha, these objectives emphasize enhancing the quality of urban spaces to create vibrant and well-crafted public areas, introducing new density

models and building types, conserving natural and built environments, and establishing urban growth boundaries around the metropolitan area.

(2) People-centred approach

Within the Qatar National Development Framework, policies on affordable housing reflect a people-centred approach. Policy LC4 aims to ensure the development of high-quality, affordable housing on urban land with easy access to community services and public transport, focusing on efficient land use and urban residential patterns. Policy LC5 seeks to address worker housing issues through the creation of high-quality integrated housing plans, reinforcing social welfare and urban inclusivity.

(3) Financing and investment

The strategic implementation of sustainable urban development in Doha is backed by a national budget prepared by the Ministry of Finance, which prioritizes funding for sustainable public facilities and infrastructure. Investments in human capital aim to develop an economy that is competitive on a global scale, adaptable to future changes, and attractive to both domestic and foreign investments.

(4) Institutionalized practice

In 2021, Qatar completed a Voluntary National Review (VNR), evaluating progress toward achieving the 2030 Agenda for Sustainable Development. This review not only served as a monitoring mechanism but also institutionalized transparency and accountability in the implementation of development actions. The Qatar National Vision 2030 and the upcoming Third National Development Strategy (2024–2030) provide a comprehensive roadmap for sustainable development strategies. For Doha, a robust set of national development frameworks translate local policy objectives into concrete planning and construction projects, ensuring effective and aligned implementation (Figure 2.16).

Learning aspects

1. Innovation

(1) Policy and legislative innovation

In 2019, Qatar introduced the Gulf region's first comprehensive national urban planning legislation,

Permanent Mission of the
State of Qatar to the United Nations
New York

الوفد الدائم لدولة قطر
لدى الأمم المتحدة
نيويورك

9 August 2020

Excellency,

I have the honour to refer to your letter dated 30 July 2020, addressed to all Permanent Representatives and Observers to the United Nations, regarding the Voluntary National Reviews (VNRs) at the 2021 High Level Political Forum on Sustainable Development (HLPF), which will be convened under the auspices of the Economic and Social Council.

In this regard, I would like to inform you that the State of Qatar would like to present a Voluntary National Review during the 2021 High Level Political Forum on Sustainable Development.

Please accept Excellency the assurances of my highest consideration.

Alya Ahmed S. Al-Thani
Ambassador
Permanent Representative

Figure 2.16 Qatar Voluntary National Review 2021

pioneering policies to ensure evidence-based decisions and promote inclusive, sustainable planning processes. A key element of this legislation was the establishment of the Directorate of Urban Development, responsible for monitoring urban growth and ensuring the effective implementation of urban plans.

(2) Innovative governance models

This urban planning legislation also brought forward governance innovations, such as the creation of clear planning hierarchies, clarification of roles and consultation processes, and the establishment of review deadlines. These measures are designed to improve efficiency, transparency, accountability and public participation in the planning process.

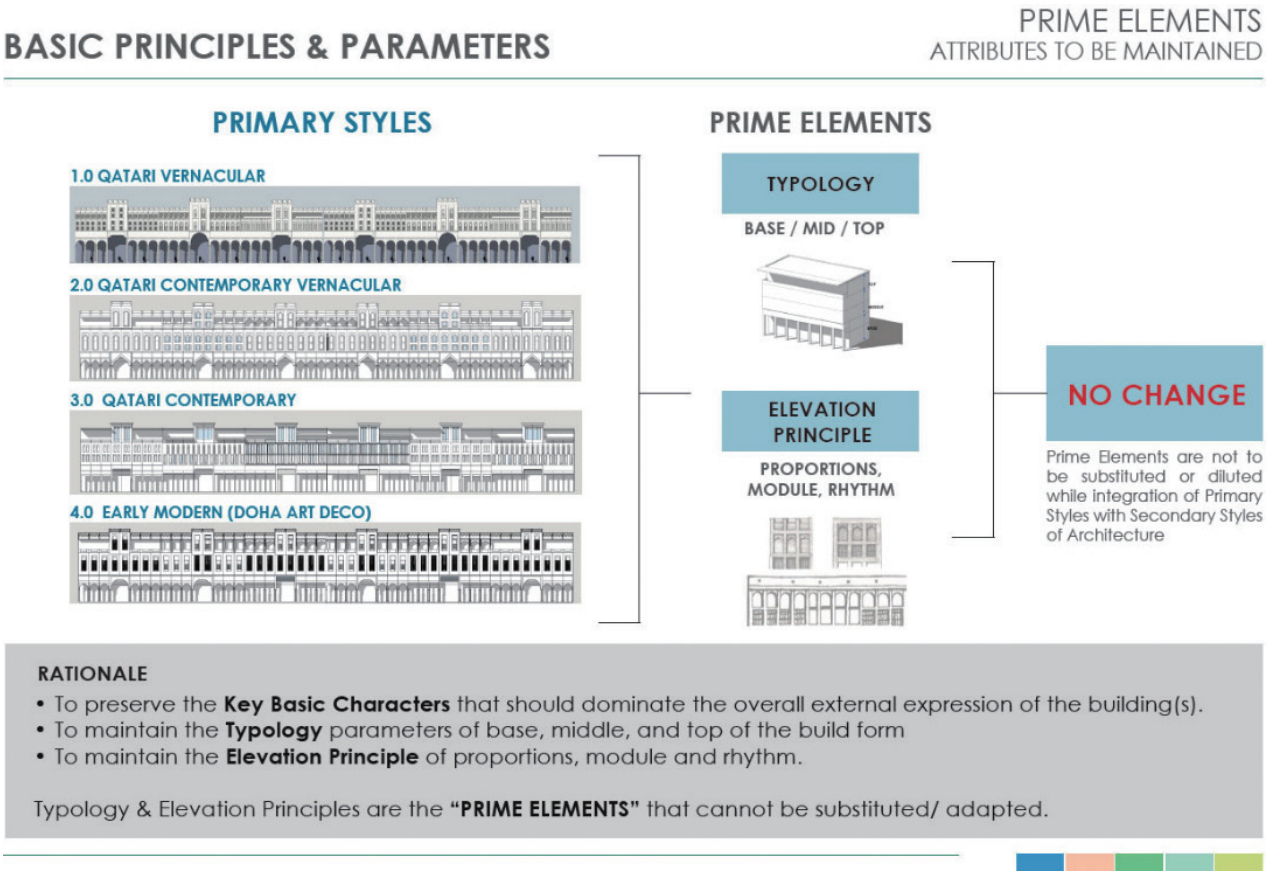
(3) Planning and design innovation

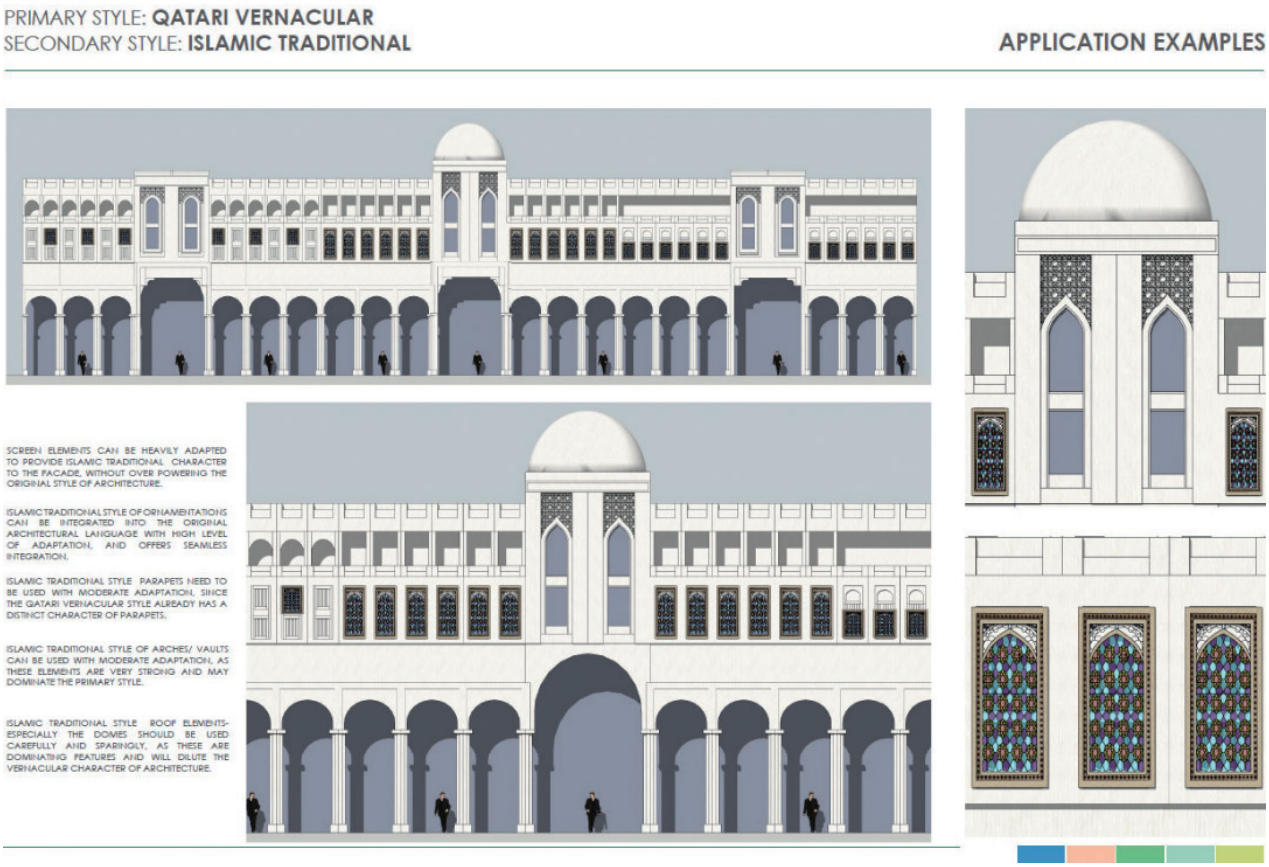
Qatar has implemented various groundbreaking initiatives, including:

① Qatar Urban Design Compendium: a toolkit and guidance document for urban design aiming to create human-centred, healthy, livable, walkable, resilient, climate-sensitive and sustainable cities.

② Three-dimensional Regulatory Model: a form-based regulatory framework that replaces traditional two-dimensional planning. This model is applied in complex areas like downtown Doha to ensure more effective regulation of building and plot development.

③ Qatar Townscape and Architecture Guidelines: these guidelines aim to maintain strong cultural identities and high-quality living environments across Qatar's urban developments, particularly in Doha. They guide designers to blend traditional history, culture and social values into modern architecture, creating distinctively local urban spaces while enhancing overall city design and livability (Figure 2.17).





Source: https://aeb-qatar.com/project/qatar-townscape-and-architectural-guidelines/.

Figure 2.17 Qatar Townscape and Architectural Guidelines

(4) Innovation in financing mechanisms

To stimulate private sector investment in sustainable development, Doha has adopted PPP. A specialized PPP department was established within the Ministry of Commerce and Industry, complemented by new legislation formalizing PPP frameworks. These mechanisms encourage market-based solutions, enhance collaborative efficiency, and support sustainable financing by distributing risks between public and private entities.

2. Adaptability

The Qatari Minister of Municipality underscores Doha's position as a leading model for sustainable urban development, both regionally and globally, emphasizing its adaptability in transitioning towards a post-oil economy. Doha's dedication to sustainable urban progress is reflected in its ability to adopt flexible approaches to emerging challenges. Guided by the Qatar National Development Framework, Doha's spatial development strategy prioritizes the promotion of sustainable urban living while proactively addressing future demands. By continually adjusting its urban planning policies, Doha has successfully cultivated a resilient framework tailored for a post-oil future, illustrating a strong commitment to adaptability. Doha plays an active role in the Gulf Engineering Forum, facilitating the exchange of best practices on both regional and international levels. Its involvement with the UNESCO Global Network of Learning Cities and the establishment of cooperative relationships with other urban centres further demonstrates Doha's ability to embrace evolving trends in urban governance and apply successful localized practices.

Iztapalapa, Mexico

Overview

As the most populous district in Mexico City, Iztapalapa has long grappled with persistent challenges including poverty, unemployment and security issues. To address these concerns, the local government has implemented a comprehensive strategy that mobilizes both economic and social resources. This approach combines innovative spatial interventions with targeted social programes to advance gender equality, promote youth development, enhance community infrastructure, and foster social inclusion and cohesion. By integrating diverse initiatives within a structured urban-social framework, Iztapalapa has undergone a transformation, establishing itself as a people-centred model for sustainable urban development (Figure 2.18).

Figure 2.18 Iztapalapa cityscape

Development context

1. Context

Iztapalapa, with its 1.835 million residents, accounts for 22 percent of Mexico City's total population, making it the city's largest district. It serves as the economic hub of the eastern region, characterized by dynamic commercial activities and a robust trade and services sector. The district ranks second in manufacturing output citywide and has witnessed considerable growth in international trade. Additionally, Iztapalapa is home to the city's largest supply market, attracting more than 500,000 visitors daily for business transactions. Its rich historical and cultural heritage, along with its natural resources, makes Iztapalapa a key destination for tourism, cultural events and sports activities (Figure 2.19 ~ Figure 2.21, Table 2.3).

2. Main challenges encountered

Despite its economic significance, Iztapalapa faces profound social and economic disparities. Currently, 43 percent of the district's population lives in poverty,

Table 2.3 Key urban data of Iztapalapa

Indicator	Date	Notes
Permanent population (2023)	183,548.6	
Administrative area	116.67 km^2	
Built-up area	108.70 km^2	
GDP per capita (2023)	USD 5,467	

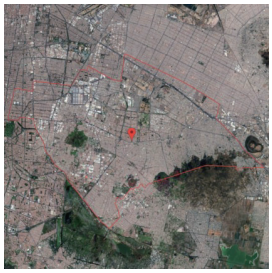


Figure 2.19 Agadir's location

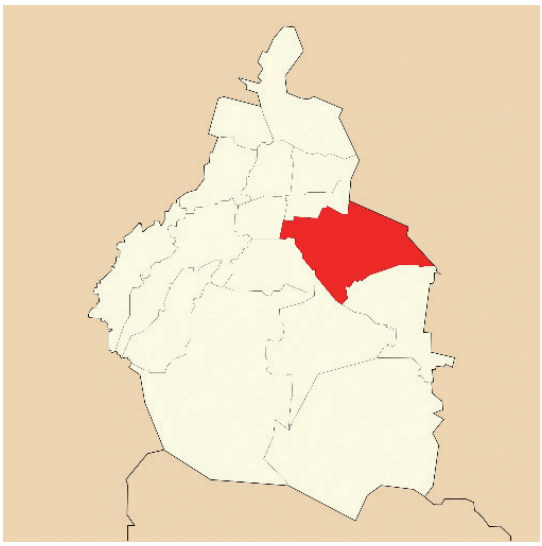


Figure 2.20 The location of Iztapalapa within Mexico City

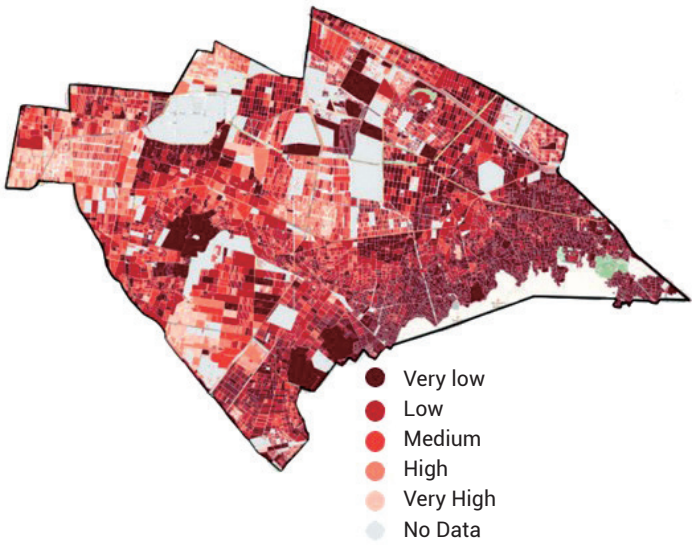


Figure 2.21 The index of social development of Iztapalapa

and 23 percent is engaged in the informal economy. Historically, the district has lagged in infrastructure development and the provision of essential social services, exacerbating regional inequalities. Challenges such as inadequate management of natural areas, water scarcity and geological subsidence pose serious risks to residents' fundamental rights and impedes progress toward sustainable development objectives.

Sustainable development strategies

1. Overall strategy

Iztapalapa's sustainable development strategy is centred on the principle of the "Right to the City". This forward-looking strategy is distinguished by a comprehensive development vision, efficient management and well-defined implementation models that prioritize public interest. Embracing gender equality, intergenerational collaboration and cross-cultural perspectives, the approach fosters interdepartmental cooperation and streamlines operations. Supported by a coordinated, transparent and moderately decentralized governance structure, this strategy promotes extensive social and regional participation, enhancing community engagement in the district's sustainable transformation.

2. Action strategy

Iztapalapa's sustainable development strategy is built on four core pillars: social; economic; environmental; and cultural sustainability. These pillars are the foundation for a coordinated portfolio of policies, projects and initiatives aimed at fostering equality,

democratic participation, citizen empowerment, transparency, accountability, social partnerships, safety and effective governance. These efforts align with the objectives of the 2030 Agenda for Sustainable Development and embody the principles of the New Urban Agenda.

Feature activities

Action 1: UTOPIAS (2019—2024)

UTOPIAS is a transformative social and urban strategy aimed at reducing social and spatial inequalities and enhancing community well-being through integrated public spaces. This initiative offers diverse, inclusive and sustainable facilities such as senior day-care centres, disability rehabilitation centres, theatres, swimming pools, playgrounds and a repurposed Boeing aircraft as a community library. By positioning public spaces as central assets, UTOPIAS promotes human rights, equitable access to resources and community inclusivity. Over four years, UTOPIAS has revitalized more than 500,000 m^2 of public space benefitting over 8 million participants and visitors (Figure 2.22 ~ Figure 2.23).

Figure 2.22 Before the renovations

Figure 2.23 After the renovations

Action 2: Women's safe pathways and bright, secure communities

Launched in 2018 as part of the Urban Action project, this initiative addresses high rates of violence and deteriorating infrastructure, particularly benefiting women, children and vulnerable groups. Key actions include enhanced street safety, upgraded transport, improved lighting and urban beautification. Through the Bright and Secure Communities component, street, alley and community lighting have been upgraded, featuring lights that promote messages of support for women, equality, justice and peace. To date, the initiative has achieved significant results, covering over 80 communities, with full implementation projected by 2024. Notable outcomes include a 48 percent reduction in high-impact crimes, a 57 percent decrease in robberies, a 26 percent reduction in drug-related incidents and a 44 percent decrease in crimes against women (Figure 2.24).

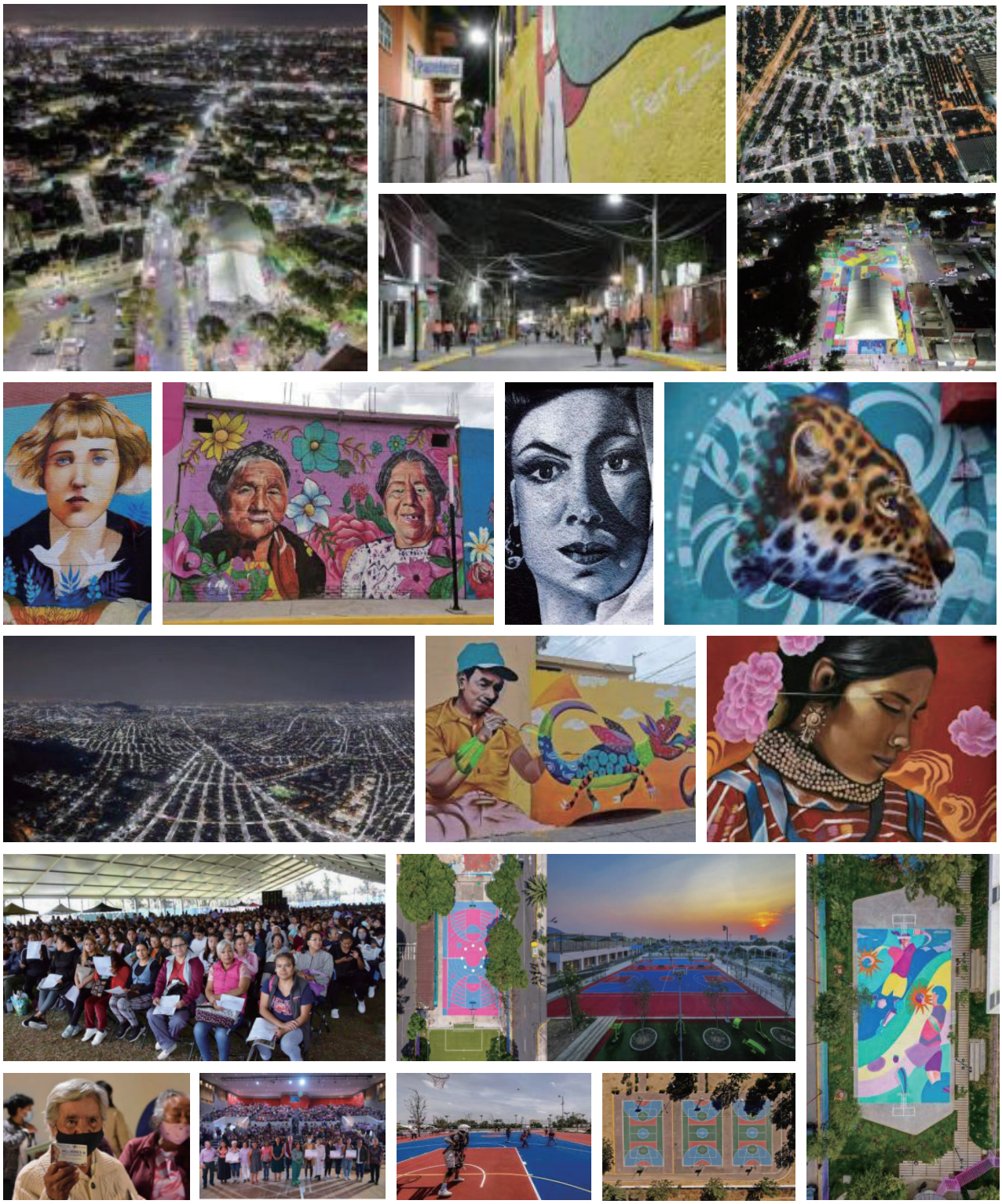


Figure 2.24 Bright and safe communities with women's education initiatives

Action 3: Sustainable greening strategy

To enhance accessible green spaces and mitigate the impact of urban expansion on nature reserves, Iztapalapa has implemented a comprehensive sustainable greening initiative. This strategy encompasses the reforestation of native tree species and the establishment of a fruit tree planting programme, resulting in the successful planting of over 202,000 native trees and 88,000 fruit trees to date. Additionally, the initiative has led to the creation of 64 urban gardens and the establishment of agricultural ecology schools. These efforts have significantly increased per capita green space from 4.63 m^2 in 2018 to 9.03 m^2 today, while also fostering agricultural self-sufficiency within local communities. A greenhouse, with an annual production capacity of 22 tons of high-quality vegetables, contributes to improved community nutrition and economic resilience by supporting household incomes. Furthermore, the project includes the restoration of a 6.5 hectare area, integrating the development of five water bodies and wetlands. This restoration has reintroduced essential ecosystem services, such as water filtration and biodiversity conservation, that had previously diminished (Figure 2.25).

Figure 2.25 Resident participation in urban Sustainable greening initiative

Action 4: San Miguel community transformation

The San Miguel community has long faced challenges related to marginalization, high crime and insecurity. Addressing these issues, the Iztapalapa 2025 Urban Planning Seminar, held in 2013, proposed a series of short-, medium- and long-term transformation strategies beginning with the renewal of San Miguel. Despite complex land use patterns and a fragmented

layout that poses management challenges, the area holds substantial potential for social transformation. The government's vision aims to enhance connectivity and optimize spatial planning, transforming San Miguel into a cohesive, vibrant and resilient community (Figure 2.26).

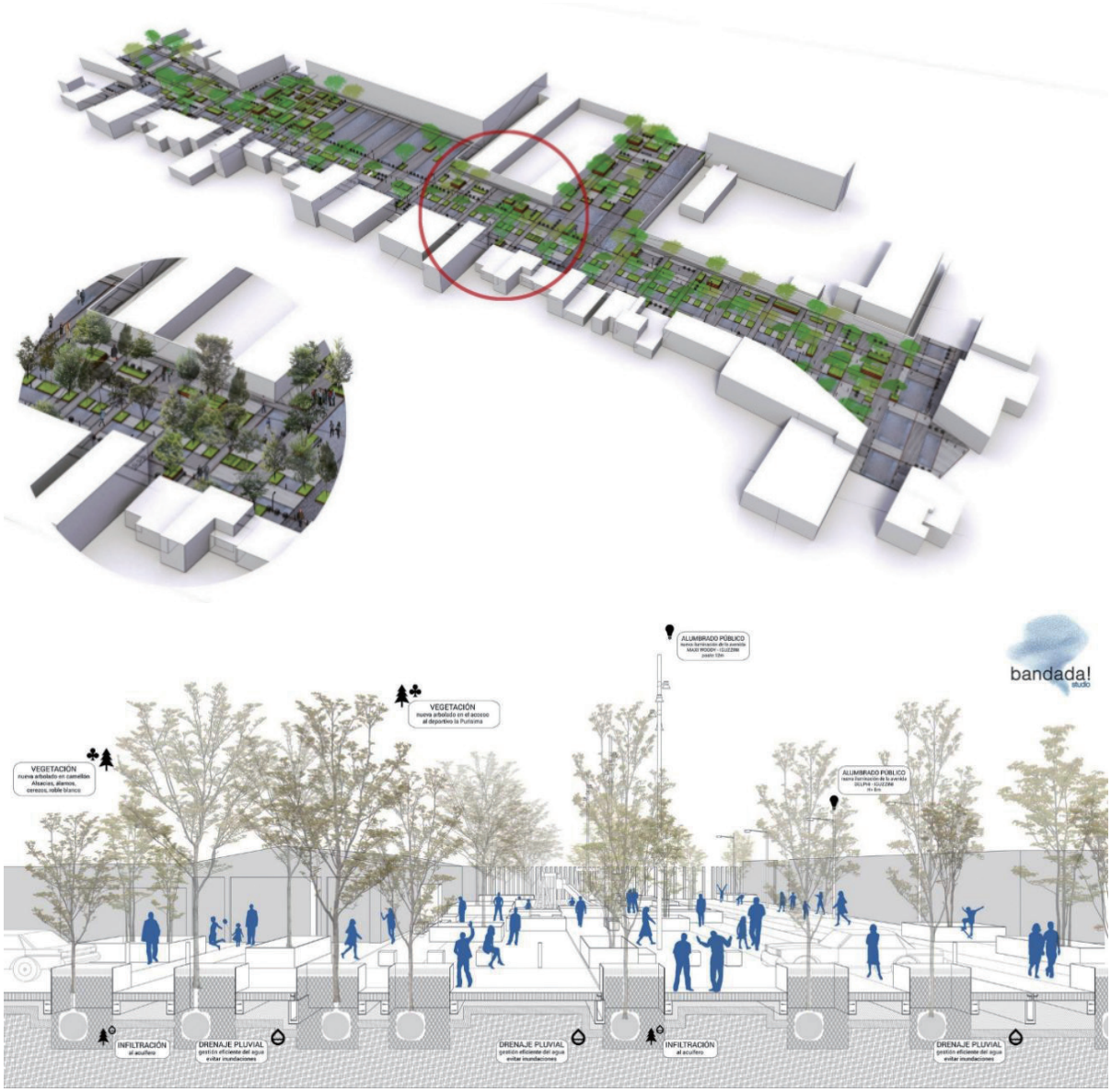


Figure 2.26 Master Plan of the San Miguel Community Renewal Project

Main achievements

1. Impact

(1) Youth-driven vibrant communities

To enhance the well-being of its youth population – 32.2 percent of the total demographic, aged between 15 and 34 – the Iztapalapa municipal government has implemented a range of strategic interventions. In the area of health, the Colibrí Centre offers non-punitive support to youth engaging with psychoactive substances, while specialized facilities such as the "Bowl House" and "House of Emotions" provide

adolescents with free access to medical services, psychological counseling, suicide prevention programmes and comprehensive sexual education. The Telpochcallin initiative creates diverse learning and development opportunities for at-risk youth, integrating academic, sports and cultural activities to foster holistic growth. To address gender equality, the Forever Alive strategy equips women with tools to identify and counter violent behaviour, while efforts to reduce inequality focus on dismantling the stigmatization surrounding young users of psychoactive substances, encouraging their involvement in decision-making processes and public life. In addition, the "Peace is Our Task" strategy, promoted across schools and households, aims to instill peaceful conflict resolution practices and prevent violence. Iztapalapa is committed to developing a people-centred, inclusive, democratic and sustainable urban framework that promotes youth development and guarantees the protection of their social, economic and cultural rights.

(2) Driving urban prosperity through innovation

Iztapalapa has nurtured a dynamic business environment by fostering entrepreneurship, attracting investment, expanding the supply of products and encouraging the recycling of construction waste. These efforts have resulted in increased employment opportunities and higher incomes for residents. Between 2018 and 2023, the Tequicalli employment centre served nearly 50,000 citizens providing training to over 30,000 individuals and creating over 5,700 jobs. The district also supported 400 cooperatives and 3,500 businesses through social economy organizations, while microfinance programmes benefitted 7,000 people. As a result, per capita GDP rose from USD 3,295 in 2020 to USD 5,467 in 2022 and unemployment decreased from 4.76 percent in 2015 to 3.75 percent by 2020. The MERCOMUNA programme, launched in 2020, assisted approximately 200,000 families and 20,000 small businesses affected by COVID-19. In addition, the From Fields to Cities initiative delivers affordable quality products to 13 communities, supporting around 100,000 families each month.

(3) Building a low-carbon, climate-resilient city

Committed to low-carbon development and climate resilience, Iztapalapa has adopted a growth model that reduces carbon emissions, improves public health and strengthens community resilience. Green transport options, such as cable cars, elevated trams and bicycle lanes, have been introduced to reduce reliance on cars. The widespread adoption of LED lighting has cut energy consumption by 30 percent and solar water heaters installed in new UTOPIAS swimming pools are projected to save 37.4 kg of CO_2 annually. The city's large-scale reforestation project, which planted 200,000 trees, has helped to reduce carbon emissions by an estimated 600 kg. The district has also implemented a robust disaster preparedness system with early warning mechanisms, evacuation plans, resilient infrastructure and community-based training programmes, all of which have improved emergency response capabilities and bolstered community resilience.

(4) Strengthening citizen participation and community governance

Iztapalapa places a strong emphasis on inclusive citizen participation in decision-making processes, enhancing the engagement capacity of residents, communities and stakeholders through structured mechanisms such as public hearings and neighbourhood assemblies. To further empower individuals and organizations with the necessary knowledge and skills in critical areas, the region has implemented a range of capacity-building initiatives. These programmes are designed to advance sustainable community development, participatory governance, human rights protection, social inclusion and environmental sustainability. In addition, the region's participatory community planning initiative has been instrumental in addressing the challenges faced by neighbourhoods historically plagued by inequality, violence and crime. To date, this initiative has benefitted 80 communities. The ECOS Comunitarias project — a collaborative platform between citizens and social organizations — has emerged as a vital bridge facilitating constructive government-community dialogue. This project has garnered widespread recognition for fostering mutual trust and effectively resolving local challenges (Figure 2.27).

2. Sustainability

(1) Long-term urban development strategy

Iztapalapa has laid a strong foundation for achieving

Source: https://www.gob.mx/shcp/galerias/visita-a-la-uam-iztapalapa

Figure 2.27 Iztapalapa community school

the 2030 Agenda and the New Urban Agenda through the development of medium- and long-term strategies and plans. These frameworks provide in-depth analyses of the city's specific challenges and opportunities, outlining a clear vision with long-term objectives. By aligning with the SDGs and national urban strategies, Iztapalapa ensures the consistency and effectiveness of its initiatives. The district prioritizes the principles of Leaving No One Behind and People-centred Development, focusing on the needs of marginalized and vulnerable populations to protect the rights of all citizens.

(2) People-centred approaches

With a firm commitment to people-centred development, Iztapalapa has launched a variety of social programmes ranging from welfare assistance for the elderly to educational support for primary and secondary school students. During the COVID-19 pandemic, innovative market supply projects linked rural producers with urban consumers, while the UTOPIAS platform integrated legal and psychological support programmes for women facing violence with educational, care, sports and cultural development initiatives. This holistic approach enhances the efficiency and effectiveness of social services across the district.

(3) Financing and investment mechanisms

To overcome financial constraints, Iztapalapa has introduced innovative financing and investment mechanisms. By mobilizing local resources, establishing PPP and participating in international funding programmes, the district has secured the financial stability necessary for the long-term implementation of its urban development strategies. A dedicated investment fund for sustainable urban development channels resources into crucial areas such as infrastructure, basic services and affordable housing, thereby promoting the overall sustainability and resilience of the city.

(4) Institutionalized practices

To ensure the effective execution of its strategic plans, Iztapalapa has developed comprehensive guidelines and operational manuals, and established cross-sectoral committees to facilitate collaboration and shared decision-making. The district has also improved institutional capacity through targeted training programmes and has implemented transparency and accountability mechanisms. With the introduction of robust monitoring and evaluation systems, Iztapalapa ensures continuous progress and improvement in the management of its sustainable development initiatives, fostering long-term success.

Learning aspects

1. Innovation

(1) Policy and legislative innovation

Iztapalapa has adopted a holistic, multi-faceted

strategy for advancing sustainable urban development. A key element of this strategy is the establishment of a comprehensive data collection and analysis framework, utilizing advanced technology platforms and analytical tools. This enables accurate identification of urban challenges and needs, thereby facilitating data-driven, effective policymaking. The city prioritizes an inclusive approach to policy development, engaging citizens and stakeholders through community meetings and public consultations. This inclusivity enhances the diversity and legitimacy of policies, ensuring alignment with community interests. Additionally, decentralized decision-making and cross-sector collaboration have further strengthened the formulation and long-term implementation of effective policies.

(2) Innovative urban planning and design

Iztapalapa has leveraged cutting-edge tools, such as geographic information system and 3D modelling, to enhance the scientific precision of its urban spatial planning. These technologies ensure that urban projects meet land use requirements, optimize transportation systems, conserve the environment and improve overall quality of life. The planning process is characterized by its inclusivity with significant engagement from the public and local communities to ensure that outcomes meet the diverse needs of residents. Focus areas include urban safety with the integration of pedestrian-friendly zones and smart surveillance systems to enhance the security of public spaces. Climate adaptation and disaster risk management strategies are embedded in infrastructure development to promote resilience. Adopting green building standards and investing in large-scale transportation infrastructure has accelerated Iztapalapa's transition toward sustainable urban development.

(3) Innovative urban governance

The Iztapalapa government has harnessed digital technologies to streamline administrative processes and enhance transparency and accountability in urban governance. An open data portal and regular public consultations have been established to foster greater citizen engagement. These efforts have improved government credibility, created a more participatory civic culture and encouraged positive changes in citizen behaviour, revitalizing local governance.

(4) Innovative financing mechanisms

To address financial constraints, Iztapalapa has implemented innovative and diversified financing strategies. These include exploring alternative methods for resource mobilization, such as outsourcing projects and optimizing resource allocation. The city has also sought international funding and technical assistance through partnerships with multilateral organizations and development funds. To ensure the effective use of resources, Iztapalapa has implemented stringent monitoring and accountability mechanisms, ensuring transparency and efficiency in fund utilization. These innovative financing approaches have not only eased financial pressures but have also significantly advanced the city's efforts in infrastructure improvement, environmental protection and social inclusion.

2. Adaptability

Iztapalapa's focus on social inclusion, citizen engagement and equitable development offers valuable lessons for other urban areas facing social inequalities. The Safe and Free Path for Women programme has been successfully replicated across other districts by the Mexico City government, highlighting its role in improving women's safety and promoting gender equality. Additionally, the UTOPIAS initiative has gained recognition and adoption at both national and international levels, drawing collaborative support from local authorities, international organizations, civil society and private sector partners. This cooperation has expanded the reach and impact of the initiative, establishing it as a model of adaptable urban practice.

Melbourne, Australia

Overview

Melbourne is charting a path towards an inclusive, sustainable and resilient future. Since 2016, the city has successfully reduced greenhouse gas emissions from its urban operations by an impressive 76 percent. Central to this progress is the introduction of

a pioneering renewable energy procurement model, designed for scalability on a global level. In addition, the city has made significant headway in enhancing urban biodiversity and completing key urban renewal projects such as the transformation of Southbank Boulevard. Melbourne's commitment to innovation and sustainability remains strong, with a continued focus on bold and transformative actions. Current initiatives range from providing housing solutions for the homeless to the Power Melbourne project which is designed to decarbonize the city's energy supply using advanced battery storage technology. This project not only supports the city's climate goals but also fosters new job creation. In addition, Melbourne is implementing integrated water management strategies to address escalating climate challenges, contributing to the city's ongoing efforts to enhance overall livability and resilience (Figure 2.28).

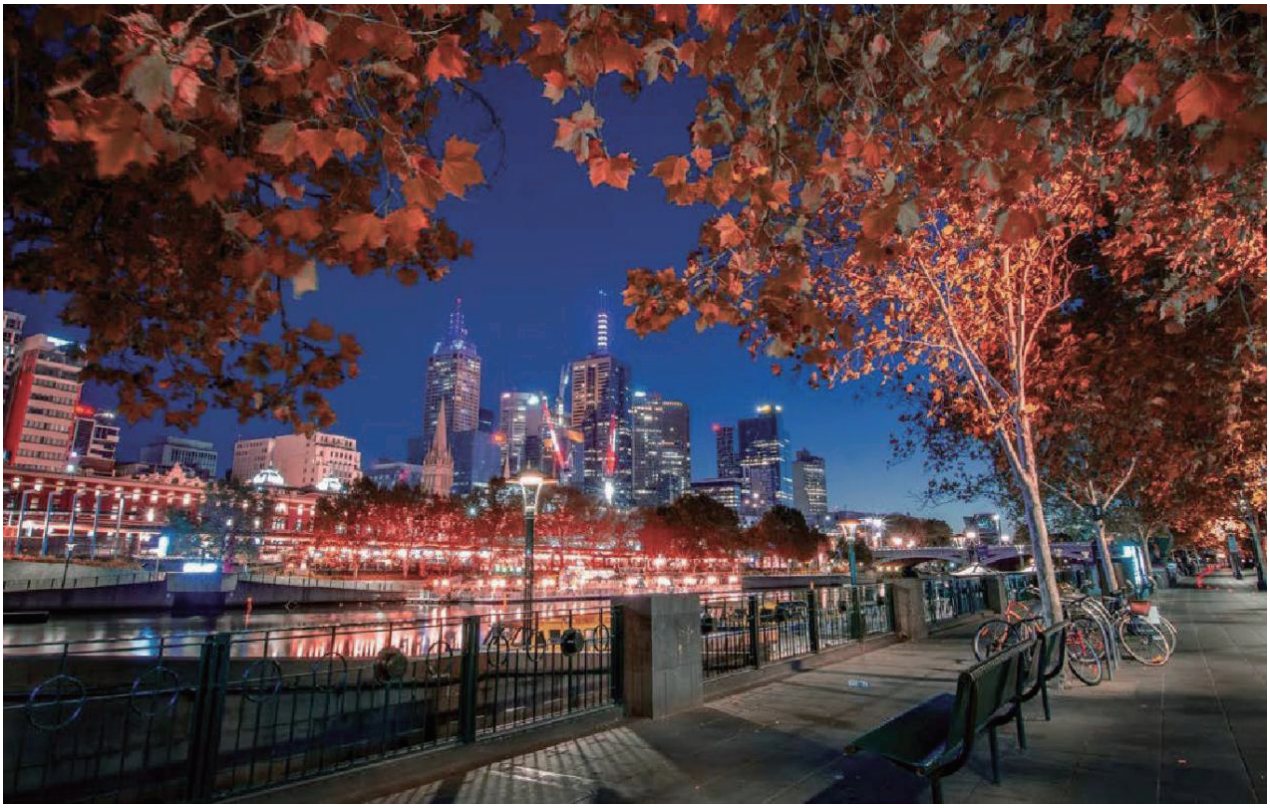


Figure 2.28 Melbourne at night

Development context

1. Context

Melbourne, the capital of the state of Victoria and one of Australia's largest cities, continues to make significant progress in green urban development. The proportion of the population living in relative poverty is steadily declining, reflecting ongoing efforts to enhance social welfare. The city also maintains a high rate of fully vaccinated children, while educational outcomes show promising trends with literacy and numeracy skills among students exceeding the state average. In terms of sustainability, Melbourne has achieved a notable decrease in residential water consumption – well below the Greater Melbourne average. The share of renewable energy in the city's electricity grid is also on the rise, and more residents are choosing public transport as their primary mode of travel, supporting sustainable urban mobility. Community engagement with urban parks is strong, signalling the value residents place on green spaces

and active living. Melbourne also remains a vibrant multicultural hub, with a significant part of the population embracing and contributing to the city's diverse cultural identity (Figure 2.29, Table 2.4).

2. Main challenges encountered

The COVID-19 pandemic has been one of the most profound public health and economic challenges Melbourne has faced in recent history, exerting significant and lasting effects on local businesses and communities. The crisis highlighted several vulnerabilities, particularly in areas such as food security, housing affordability and employment stability. Alongside these challenges, there has been a marked rise in mental health issues, including increased levels of anxiety and depression, which have led to a higher consumption of alcohol, nicotine and other substances among residents. As Melbourne navigates these challenges, it is imperative for the city to enhance efforts towards achieving the SDGs, especially in fostering resilience and well-being. A critical aspect of this approach will be to drive innovative solutions that expand the integration of renewable energy into the local power grid (Figure 2.30).

Table 2.4 Key urban data of Melbourne

No.	Indicator	Data	Notes
1	Permanent population (2023)	149,600	Based on 2020 data
2	Administrative area	37.70 km²	
3	Built-up area	37.08 km²	
4	GDP per capita (2023)	USD 78,130	

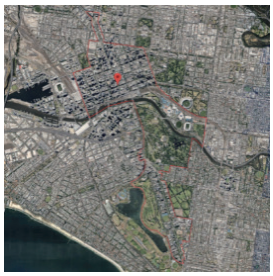
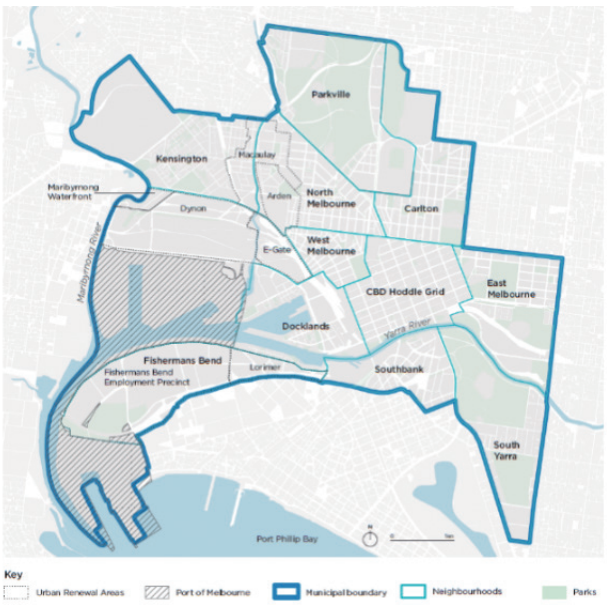


Figure 2.29 Melbourne's location



City of Melbourne in numbers

City of Melbourne area	37.7 square kilometres
Estimated resident population	183,756 (2020)
Number of suburbs	14
Top three estimated resident populations of the municipality by small area	
Melbourne (including central city)	53,180 (2020)
North and West Melbourne	27,740 (2020)
Southbank	27,444 (2020)
Residential dwellings	94,600 (2020)
Median age	28 (2016)
Daily population (on average weekday)	910,800 (2019)
International visitors per year (to Metropolitan Melbourne)	591,833 (2020)
Residents born overseas	56% (2016)
Overseas higher education students living or studying in the municipality	87,300 (2019)
People who speak language other than English at home	48% (2016)
Most common language spoken, other than English	Mandarin: 19% (2016)
Household size (average persons)	2.0 (2016)
Weekly household income (median)	$1354 (2016)
Family households	43% (2016)
Lone person households	36% (2016)
Rented households	66% (2016)
People who live in a flat or apartment	83% (2016)

Figure 2.30 Municipal map and key figures of Melbourne

Sustainable development strategies

1. Overall strategy

Melbourne has positioned itself as a pioneering city in Australia by voluntarily adopting the 17 SDGs into its local policy frameworks and development strategies. To ensure the effective implementation of these global goals, the City Council has integrated the SDGs into its 2021—2025 Council Plan. This forward-looking initiative is further supported by the introduction of a Voluntary Local Review (VLR) mechanism, which allows for systematic tracking and assessment of the city's progress towards achieving the SDGs. By embedding these goals into urban planning, governance structures and public service provision, Melbourne is committed to driving sustainable urban development through coordinated, action-oriented strategies (Figure 2.31).

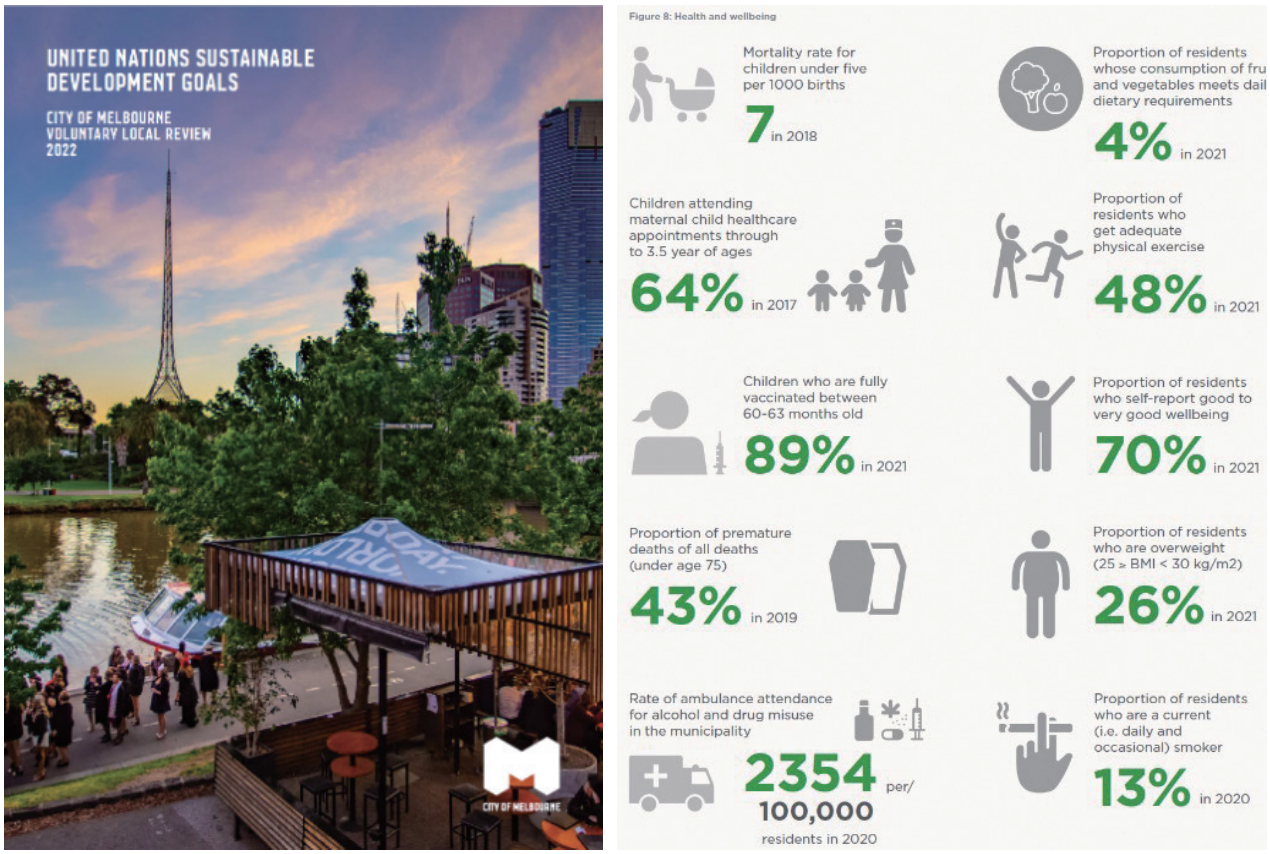


Figure 2.31 City of Melbourne's Voluntary Local Review 2022

2. Action strategy

Since 2016, Melbourne has implemented a range of targeted action strategies to foster urban sustainability. Key initiatives include:

(1) Carbon neutrality and renewable energy

Since 2012, Melbourne has maintained carbon-neutral certification for its municipal operations, achieving a 79 percent reduction in emissions over the past decade. Through innovative energy procurement strategies and the development of renewable energy initiatives, Melbourne has successfully transitioned to 100 percent renewable energy for municipal services.

(2) Urban habitat and waste management

In its commitment to enhancing urban biodiversity, Melbourne plants 3,000 trees annually to expand its urban forest. Since 2017, the city has increased its understory vegetation by 121,000 m^2, representing a 26 percent growth and contributing to the creation of new

habitats for urban wildlife. Additionally, Melbourne has installed six stormwater harvesting systems that now provide 23 percent of the city's water needs. In waste management, the city has diverted over 1,900 tons of organic waste into compost, thereby reducing the environmental footprint of urban waste.

(3) Flagship projects

Several landmark projects have been completed in recent years to promote sustainable urban living. The Southbank Boulevard redevelopment has transformed the area into a pedestrian-friendly, green public space. Power Melbourne has introduced a community-scale battery network to strengthen the integration of renewable energy into the city's grid. The Make Room initiative repurposes municipal buildings to provide temporary housing for individuals experiencing homelessness, addressing a critical social need. And the Night Justice project focuses on creating a safer and more inclusive nighttime environment, particularly aimed at enhancing the safety of women in public spaces.

Feature activities

Action 1: Creating energy-efficient communities (2021—2025)

Melbourne is dedicated to building sustainable, affordable and energy-efficient communities that appeal to its residents, workers, global visitors and investors. A key element of this vision is making renewable energy accessible and affordable for all (Figure 2.32).

Figure 2.32 Power Melbourne project

The Melbourne Power Company is leading this effort by deploying a mid-scale battery network throughout the city. In the pilot phase expected to conclude by mid-2024, three battery storage systems with a combined capacity of 450kW/1MWh will be installed in Library at The Dock, Boyd Community Hub and City Hall. Melbourne plans to introduce electricity retail programmes tied to this battery network which will simplify access to affordable renewable energy for apartment owners, renters and small business

owners. This initiative aims to empower residents and businesses to adopt alternative energy plans, thereby driving the development of sustainable energy technologies. The city is collaborating with the University of Melbourne and the Royal Melbourne Institute of Technology University through the Power Melbourne initiative, leveraging their expertise in energy markets, power systems, smart grids and renewable energy as demonstrated by the success of the Melbourne Renewable Energy Project.

Action 2: Prepare Melbourne (2022—2025)

As part of the 2021—2025 Council Plan, Melbourne has introduced the Prepare Melbourne initiative, a four-year project aimed at strengthening community resilience to disasters, emergencies and the health impacts of climate change. The initiative comprises three main components:

(1) Community Resilience Assessment Workshops
Melbourne is hosting a series of workshops to evaluate the vulnerabilities and strengths of various communities in facing climate challenges. These workshops will inform the development of customized strategies to enhance local resilience.

(2) Heat Risk Platform Development
In partnership with Climasens, a local climate intelligence startup, Melbourne is creating a Heat Risk Platform. By analysing real-time weather and climate data, this platform will identify areas of high heat risk enabling the city to better prepare for and respond to summer heatwaves.

(3) Public Awareness and Education Programmes
Melbourne is also investing in educational initiatives designed to increase public understanding of climate resilience and adaptation strategies, equipping residents with the knowledge and resources necessary to respond effectively to climate-related challenges.

Action 3: Integrated Water Resource Management (2021—2025)

Recognizing the critical role of water in urban livability and community well-being, Melbourne is implementing an Integrated Water Resource Management strategy. This holistic approach treats the city as a unified catchment area and coordinates all aspects of the water cycle, including usage, stormwater, wastewater and groundwater to ensure sustainable management and maximize environmental benefits (Figure 2.33).

Figure 2.33 Integrated Water Resource Management plan

The Integrated Water Resource Management plan includes a range of innovative actions, such as capturing and treating local rainfall for irrigating open spaces, deploying smart flood management solutions, and enhancing the design of trees and gardens to reduce pollutants entering waterways. These measures collectively aim to lower flood risks, minimize waterway pollution and strengthen water security.

Over the past four years, Melbourne has made significant advances in water management. Achievements include the enhancement of water-sensitive open

spaces and streetscapes, the implementation of a comprehensive 10-year stormwater harvesting and flood mitigation strategy, and the increased use of up to 25 percent non-potable water sources, such as rainwater and stormwater, for irrigating parks and gardens. Additionally, Melbourne has succeeded in reducing nitrogen pollution in stormwater runoff by 13 percent, contributing to improved water quality and environmental health.

Figure 2.34 Power Melbourne activities

Main achievements

1. Impact

(1) Social impact

Melbourne's drive to create energy-efficient communities and implement energy-saving initiatives plays a pivotal role in its aim to achieving 100 percent renewable energy by 2030. The city's inclusive policies address the needs of women, Indigenous communities, veterans and the elderly, ensuring equitable access to the benefits of these initiatives and reinforces Melbourne's position as a global leader in clean energy innovation. Melbourne also prioritizes support for vulnerable groups, particularly those affected by mental health and addiction challenges, helping them reintegrate into society.

(2) Economic impact

Guided by its 2021—2031 financial plan, Melbourne has strategically invested in transportation, diversified industrial structures and expanded employment opportunities. Collaborative partnerships have been established to co-finance sustainable development projects, such as the Power Melbourne initiative and the Integrated Water Resource Management Programme, further contributing to the city's economic resilience (Figure 2.34).

(3) Environmental impact

Melbourne has implemented a wide range of environmental initiatives aimed at reducing its carbon footprint and enhancing urban ecosystems. A notable achievement is Amendment C376 which requires new buildings to feature at least 40 percent green space coverage. Melbourne has also fostered cross-city collaborations – facilitating the exchange of knowledge and best practices in sustainability – and building partnerships with stakeholders at local, national, regional and global levels to promote environmentally responsible urban development.

2. Sustainability

(1) Long-term urban development strategy

Melbourne recognizes that addressing global challenges requires coordinated local actions. To this end, the city uses the VLR mechanism, enabling systematic assessment and the formulation of targeted long-term strategies. These strategies focus on the development of social housing, integrated water resource management and the enhancement of public spaces through water-sensitive urban designs.

(2) People-centred approach

Committed to fostering an inclusive city, Melbourne has launched a variety of initiatives aimed at ensuring equal opportunities for all. These include affordable housing programmes, economic development strategies, a disability access and inclusion plan, and a reconciliation action plan. These efforts emphasize diversity as a core strength, promoting equal access to prosperity for all residents.

(3) Financing and investment mechanisms

In alignment with the commitments outlined in the 2021—2025 Council Plan, Melbourne has developed a comprehensive 10-year financial plan that prioritizes

investments in sustainable development. The plan was shaped by extensive community consultation and a participatory approach. To support its sustainability objectives, Melbourne continues to explore new financing mechanisms that will mobilize societal resources and secure funding for various long-term initiatives.

(4) Institutionalized practices

Melbourne is embedding the SDGs into its institutional practices by localizing these goals within the city's operational frameworks. This includes the public visualization of data, hosting leadership roundtables and launching training programmes to drive long-term sustainability efforts. Melbourne's institutional commitment to these goals ensures a cohesive approach to sustainable urban development.

Learning aspects

1. Innovation

(1) Innovative governance models

Melbourne's governance innovation is exemplified by its community-centred Neighbourhood Model which reflects a deep understanding of the diverse needs and priorities of its various communities. By adopting a more targeted, location-specific management approach, the city has improved the precision and effectiveness of its public services. This model has played a crucial role in bolstering both local economic and social development, particularly by aligning post-COVID-19 pandemic recovery efforts with the specific needs of individual communities. A key element of this governance strategy is Melbourne's distinctive policy framework which empowers communities to take a leadership role in local sustainable development initiatives. One standout example is the city's food and organic waste collection programme, a testament to innovative community collaboration. Since its launch in 2021, the programme has successfully diverted 3,300 tons of organic waste from landfills, transforming it into compost used for the city's green spaces, thereby supporting the growth of a circular economy. The programme's success lies in active community participation which has reduced landfill pressure while providing high-quality compost for urban greening, delivering substantial environmental and economic benefits (Figure 2.35).

Figure 2.35 Conversion of landfill waste into recyclable organic matter

(2) Innovation in technological tools

In response to mounting climate challenges, Melbourne has harnessed the potential of start-ups to develop an integrated platform that delivers real-time weather and climate data. This platform supports city planners, policymakers and residents in identifying and addressing climate risks promptly, ensuring a proactive response to environmental challenges.

(3) Innovative financing mechanisms

Melbourne's innovative financing model emphasizes collaboration to maximize the impact of sustainable development initiatives. The Melbourne Renewable Energy Project exemplifies this approach where the city partnered with universities and corporations to collectively procure renewable energy. The collaboration resulted in the establishment of a USD 200 million wind farm, marking Australia's first local government-led renewable energy procurement agreement. This groundbreaking initiative serves as a valuable model for other cities seeking to advance clean energy goals.

2. Adaptability

Melbourne has cultivated strong connections with urban networks at various scales, facilitating knowledge-sharing and joint efforts to address common challenges.

Nationally, the city has collaborated with the Council of Capital City Lord Mayors to promote urban climate solutions, enabling the replication of successful practices across regions. For example, Brisbane adopted Melbourne's VLR mechanism for assessing progress on the SDGs. Internationally, Melbourne's Urban Forest Strategy and Urban Forest Fund have received widespread recognition, and the Melbourne Renewable Energy Project continues to attract global interest as a pioneering model for renewable energy procurement. Through these efforts, Melbourne is steadily enhancing its competitive edge, positioning itself as a national leader in clean technology and a hub for innovative climate solutions.

Thiruvananthapuram, India

Overview

Thiruvananthapuram, the capital of Kerala in southern India, is rapidly emerging as a leading centre for innovation, culture and commerce. The city draws on its rich historical heritage, natural beauty and growing technology sector to fuel its development. With its 2030 Development Plan, Thiruvananthapuram is committed to building a knowledge-driven economy by creating jobs, improving transport efficiency and addressing diverse housing needs. As a major hub for India's information technology sector, the city is recognized globally for its commitment to sustainable urban development. Key initiatives include solar energy deployment, promoting electric vehicles and fostering PPP. In addition, the city has developed a smart environmental monitoring system and a centralized command centre while promoting zero-emission public transport and inclusive, accessible public spaces positioning itself as a leader in smart urban solutions (Figure 2.36).

Development context

1. Context

As the capital of Kerala, Thiruvananthapuram is ranked among India's top five cities on the National Institute of Urban Affairs Sustainable Development Goals Index. The city is leveraging its diverse natural landscapes and rich resources to become a centre for innovation, culture and commerce. Thiruvananthapuram's development strategies place significant focus on education, health-care, gender equality and poverty alleviation, with programmes such as public food distribution and free meal initiatives significantly improving the quality of life for residents. The city's development vision is driven by Kerala's fertile land, abundant water resources and highly educated workforce, aiming to create a knowledge-based society with a service-oriented economy. Emphasizing sectors such as tourism, smart waterways and pharmaceuticals, Thiruvananthapuram has made substantial progress in intelligent transportation systems, the adoption of renewable energy and the provision of innovative public services. The implementation of the 2030 Development Plan is geared towards increasing per capita income, reducing

Figure 2.36 Thiruvananthapuram cityscape

unemployment and transforming the city into a modern, economically prosperous, socially inclusive and environmentally sustainable urban centre (Figure 2.37, Table 2.5).

Table 2.5 Key urban data of Thiruvananthapuram

No.	Indicator	Data	Notes
1	Permanent population (2023)	330,730	
2	Administrative area	2,192 km^2	
3	Built-up area	-	
4	GDP per capita (2023)	USD 1,740	

Figure 2.37 Thiruvananthapuram's location

2. Main challenges encountered

Despite notable progress, Thiruvananthapuram faces significant challenges in its development trajectory. Rapid population growth has placed considerable strain on the city's infrastructure, particularly in areas such as transportation, housing and public services. Climate change poses another critical challenge with frequent flooding underscoring the urgent need for enhanced climate resilience and the development of sustainable green infrastructure to mitigate environmental risks. While substantial headway has been made in education and healthcare, ensuring that development is equitable and inclusive – particularly for vulnerable groups – remains a key challenge. Achieving social equity and ensuring that all citizens benefit equally from the city's economic growth are essential goals that have yet to be fully realized.

Sustainable development strategies

1. Overall strategy

Thiruvananthapuram's sustainable development strategy is designed to promote balanced growth across economic, social and environmental sectors. The city government prioritizes creating a technologically advanced and well-serviced urban environment through various smart city initiatives. With the support of innovation hubs like Technopark and esteemed academic institutions, Thiruvananthapuram is actively evolving into a centre for knowledge and innovation, laying a robust foundation for long-term prosperity. Key infrastructure modernization efforts are ongoing in areas such as transportation, waste management and energy use. The city aims to minimize carbon emissions by adopting electric vehicles, implementing smart traffic management systems and utilizing renewable energy sources such as solar power. Additionally, PPP are instrumental in enhancing technological advancements, preserving cultural heritage, improving the overall quality of life, and fostering inclusive and equitable growth.

2. Action strategy

Thiruvananthapuram has rolled out a series of action strategies to support smart and sustainable urban growth. These initiatives include the implementation of adaptive and intelligent traffic management systems to optimize traffic flow and safety. The introduction of electric buses and charging facilities is also a significant step toward reducing dependence on fossil fuels. For public safety, the city has enhanced its emergency response capabilities through an Integrated Command and Control Centre (ICCC) which employs advanced surveillance technology to enhance safety and crime prevention. The city prioritizes green solutions by installing solar panels on buildings, thus increasing the use of renewable energy. The adoption of a smart waste management system helps reduce the city's dependence on landfills, promoting a more sustainable approach to waste handling. In addition to technological advancements, Thiruvananthapuram focuses on cultural and social projects, including the revitalization of popular streets to provide residents

with vibrant public spaces for arts and community life. Transparency and inclusiveness are central to the city's approach. By engaging in PPP and actively involving citizens in urban planning and governance, Thiruvananthapuram fosters a collective effort toward achieving a sustainable future.

Feature activities

Action 1: Smart traffic system development

Smart City Thiruvananthapuram Limited leads the city's smart initiatives, with the Thiruvananthapuram Smart City Command and Control Centre, and ICCC projects at its core. These projects aim to optimize traffic management, enhance travel experiences and strengthen urban safety. The Thiruvananthapuram Smart City Command and Control project incorporates an Adaptive Traffic Control System, an Intelligent Traffic Management System and comprehensive urban surveillance. The Adaptive Traffic Control System adapts traffic lights based on real-time conditions to ensure smooth vehicle flow, while the Intelligent Traffic Management System enforces traffic regulations, promoting road safety. The urban surveillance system monitors traffic and aids in crime detection and accident investigations, thereby improving overall safety in the city (Figure 2.38).

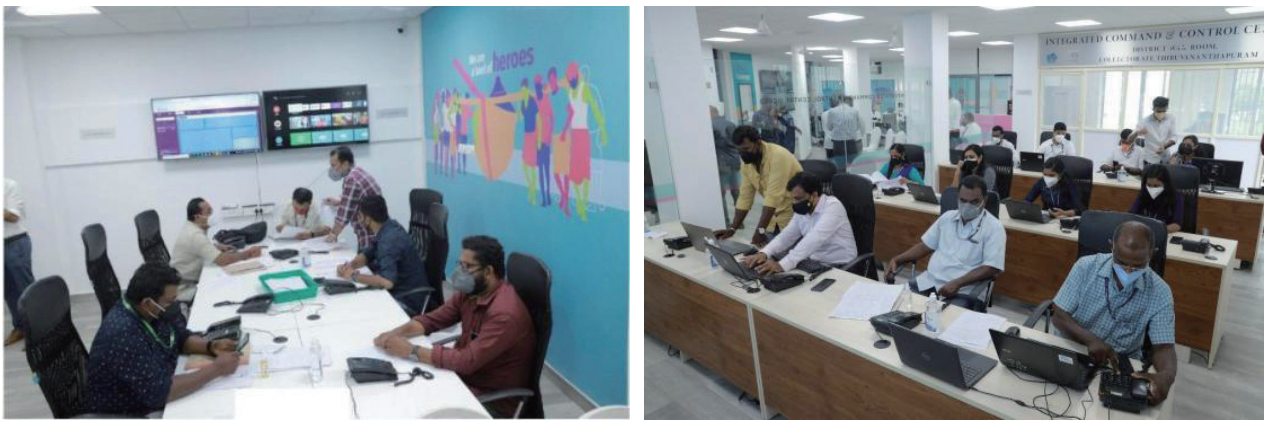


Figure 2.38 Integrated Command and Control Centre

Action 2: Establishing the Integrated Command and Control Centre

As the central nerve of Smart City Thiruvananthapuram Limited, ICCC integrates key departments including the Kerala Water Authority, road transport, health, revenue, IT, police and disaster management. This unified platform facilitates coordinated responses to emergencies and enhances the city's overall resilience. During the COVID-19 pandemic, ICCC established district control rooms that coordinated multi-departmental actions, streamlining healthcare access and serving as a central point for pandemic-related information. By managing critical resources like oxygen, hospital beds and ambulances through integrated dashboards, ICCC significantly improved emergency response capabilities. On 1 October 2021, ICCC launched a COVID-19 command room featuring a 24/7 call centre, rapid response teams, contact tracing and ambulance services, which bolstered the city's pandemic management efforts.

Action 3: Electric bus procurement

As part of Thiruvananthapuram's Smart City initiative, the electric mobility project has introduced 113 fully electric buses procured from the Kerala State Road Transport Corporation. Approximately half of these buses serve newly developed inland areas covering 48 distinct routes and a combined distance of 11,186 km. This initiative has notably enhanced public transportation accessibility, with specific benefits for women and children. To ensure passenger safety,

each bus is equipped with CCTV surveillance systems, providing an added layer of security for all commuters, particularly women. The buses operate from 5:30 am to midnight, offering a well-considered schedule that accommodates daily travel needs while aligning with the activities of railway passengers. The deployment of electric buses has yielded significant environmental benefits including reduced carbon emissions, improved air quality and positive health impacts for children and residents alike. With a modest fare of INR 10, this service has increased the affordability and appeal of public transportation, with passenger numbers rising from 529,000 in September 2023 to 821,000 by December 2023—demonstrating the effectiveness of this "doorstep" mobility solution. Additionally, the project includes the installation of 11 charging stations which provide vital infrastructure for the electric bus fleet and further accelerate the city's transition towards sustainable, green urban mobility (Figure 2.39).

Figure 2.39 Electric buses of Thiruvananthapuram

Main achievements

1. Impact

(1) Social impact

The revitalization of Manaveeyam Veedhi, a popular street in Thiruvananthapuram, stands out as a flagship project within Thiruvananthapuram's smart city initiative. Spanning 225 m, it is the city's first designated nightlife hub, known for its vibrant wall murals on Keltron's premises and frequent cultural events. The redevelopment plan aims to transform the area into a multifunctional cultural district through infrastructural upgrades and a diverse range of activities. Key enhancements include pedestrian-friendly street layouts for full accessibility with additional features such as food stalls, rest areas, specialized street lighting, open-air libraries, sculptures, street art galleries and designated spaces for cultural activities, yoga, fitness and leisure. A central traffic island has been redesigned with Wi-Fi connectivity, CCTV surveillance and parking areas for two-wheelers. At night, the street comes alive with illuminated tree lighting and projection displays, creating an engaging atmosphere for residents and visitors, promoting a vibrant urban lifestyle (Figure 2.40).

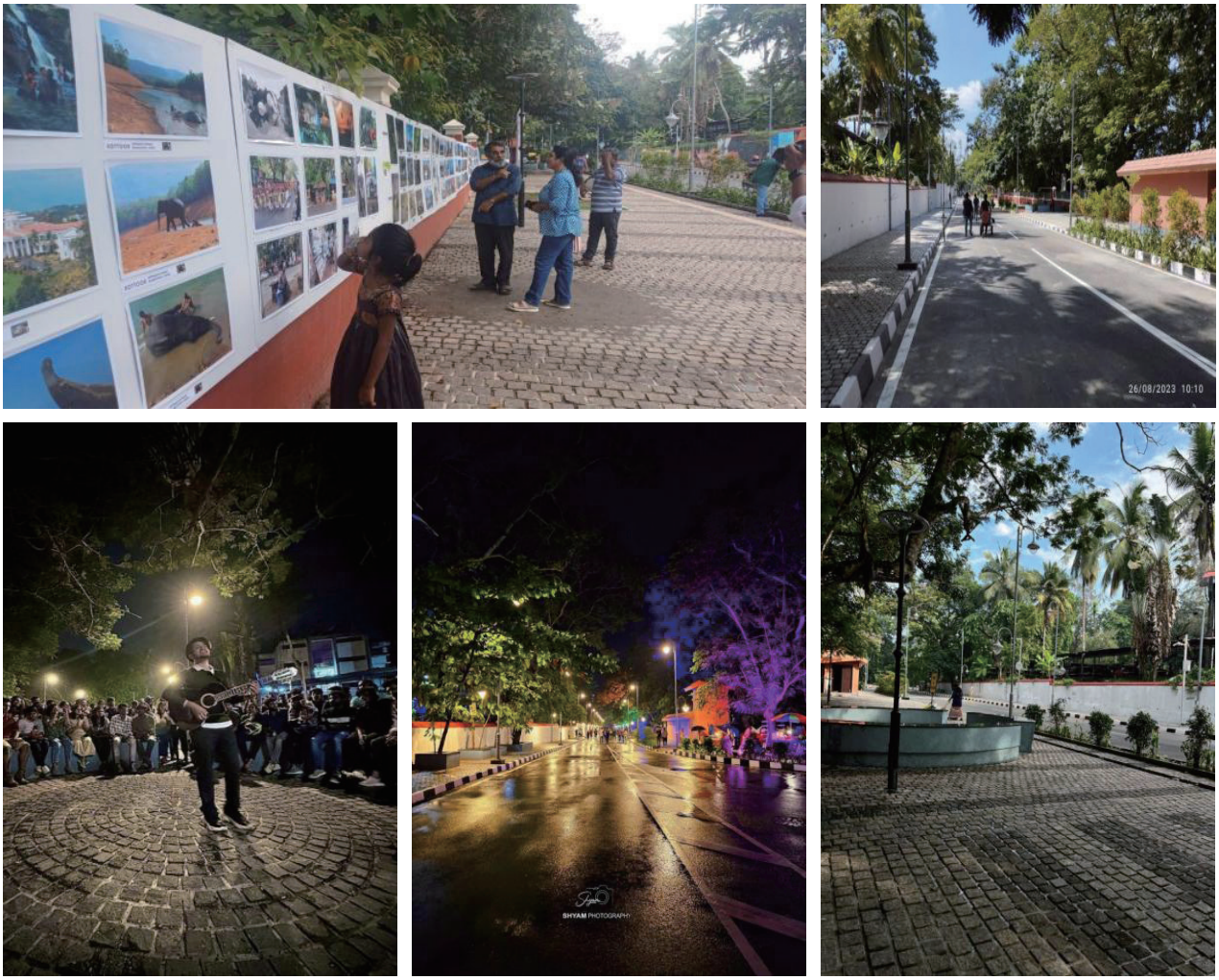


Figure 2.40 Revitalized streetscape of Manaveeyam Veedhi

(2) Environmental impact

The Rooftop Solar Installation for Government Buildings initiative is a prominent component of Thiruvananthapuram's smart city strategy, aimed at establishing the city as a leader in renewable energy adoption. The installation of solar photovoltaic systems across 504 government buildings and schools is set to generate 16 megawatts of electricity, fulfilling at least 10 percent of the city's total energy requirements through renewable sources. This project not only advances the adoption of clean energy, reducing carbon emissions and the dependence on traditional power sources, but also contributes to improved air quality and a strengthened capacity to tackle climate challenges. Integrated within the Resilience and Environment module, this project enhances the city's energy infrastructure, promotes sustainable energy use in new developments and serves as a model for clean energy implementation in urban settings (Figure 2.41).

2. Sustainability

(1) Long-term urban development strategy

Thiruvananthapuram's economic sustainability strategy aligns with the New Urban Agenda's focus on achieving "full employment and decent work for all". As part of its Smart City plan, the Economic Empowerment project emphasizes market area redevelopment, enhancing the livelihoods of street vendors and establishing incubation centres to support

Figure 2.41 Solar installations on government buildings' rooftops

small- and medium-sized enterprises (SMEs). These efforts have significantly bolstered the local economy while strengthening community identity and resilience. The incubation centres provide advanced resources, including mobile app development and e-commerce platforms, catalysing the growth of digital commerce. By providing high-quality infrastructure and promoting good governance, the project aims to achieve sustainable economic growth and poverty alleviation.

(2) People-centred approach

Thiruvananthapuram has established a Smart City Advisory Forum, bringing together a wide array of stakeholders including district commissioners, Members of Parliament, Members of the Legislative Assembly, the Mayor, chief executive officers of special purpose vehicles, local youth, technical experts and representatives from residents' associations, taxpayers' groups, slum federations, women's organizations and youth associations. The forum fosters cross-sectoral collaboration and meaningful engagement with marginalized communities, ensuring that all voices are considered in the city's development strategies. The city has adopted an inclusive participation strategy that employs both online and offline tools, such as public discussions, task allocation, online voting, public speaking events and blogs. This multi-faceted approach emphasizes Thiruvananthapuram's commitment to transparent and inclusive governance, positioning local communities as active participants in the co-creation and implementation of urban solutions.

Learning aspects

1. Innovation

(1) Innovative governance models

ICCC has demonstrated remarkable efficiency in coordinating resources and responding rapidly to emergencies. Whether managing natural disasters or public health crises, ICCC's ability to swiftly mobilize resources and streamline inter-agency communications has ensured effective responses to various challenges. This model of integrated emergency response serves as a reference for other cities aiming to enhance their emergency management systems and resilience.

(2) Innovation in technological tools

The city has successfully employed cutting-edge technologies such as intelligent traffic management systems, advanced surveillance and data-driven decision-making platforms to address complex urban issues. These innovations have not only optimized governance operations but also significantly improved safety and quality of life for residents. Thiruvananthapuram's use of digital solutions in urban governance provides a valuable template for other cities seeking to leverage technology to enhance urban

management and service delivery.

(3) Innovative planning and design

In its efforts to mitigate climate change, Thiruvananthapuram has proactively pursued strategies to reduce carbon emissions and promote the use of renewable energy. Initiatives such as rooftop solar power generation and the introduction of electric buses have significantly lowered the city's reliance on conventional energy sources while simultaneously promoting economic sustainability. These measures highlight how modern cities can balance urban growth with environmental responsibility, setting an example for cities globally on integrating green energy into urban planning.

2. Adaptability

Thiruvananthapuram's development strategy is rooted in social inclusivity and urban livability with a strong focus on safeguarding the interests of vulnerable groups. The city has adopted comprehensive measures to ensure these groups are actively included in the urban development process, preventing social marginalization. Thiruvananthapuram also emphasizes community participation in public decision-making, enhancing transparency and democratic engagement. This people-centred approach has improved the quality of life for residents and provides a model for other cities seeking to foster urban harmony through socially inclusive design and participatory governance.

Chapter 3

International Cooperation: youth-oriented international collaboration and exchange

Introduction[1]

Humanity's response to climate change is akin to a relay race, with youth serving as a primary force in climate action. As the climate crisis intensifies, the responsibilities of the younger generation have been reinforced like never before, and their climate awareness and actions are receiving unprecedented recognition. The efforts of youth to combat climate change are increasingly diversified and action-oriented: more and more young people are participating in climate communication and education activities. Contributions include: “youth power" to address climate change; expanding transnational youth action networks and platforms under the United Nations framework are amplifying “youth voices" from around the world; and within climate actions from countries in the global south, there is a growing presence of young people providing new insights into climate governance.

The younger generation has a deeper understanding of the impact of climate change, while the international community profoundly acknowledges the importance of youth in international climate cooperation. As the Rio+20 Summit resolution *The Future We Want* states, "We stress the importance of the active participation of young people in decision-making processes as the issues we are addressing have a deep impact on today's youth and future generations, and the contribution of children and youth is vital to the achievement of sustainable development[2]." Currently, the role of youth in global transformation is becoming increasingly apparent showcasing characteristics, such as diversity, internationalization and connectivity.

Youth are at present the main force for global sustainable development and climate action post–2030. United Nations Secretary-General Mr António Guterres has remarked, "So far, our generation has largely failed to protect world justice and the Earth. Your generation must hold us accountable to ensure we do not betray the future of humanity[3]." Youth participation in global climate governance plays a crucial guiding role. Through innovation and forward-thinking, communication and influence, participation and leadership abilities, and the spirit of cross-border cooperation, youth bring new perspectives and methods to global climate governance inspiring more people to participate and take action, and thereby advance the process of climate governance. The logic of youth action is to promote social and governmental change through individual and collective efforts to achieve the Sustainable Development Goals (SDGs). Through strikes, rallies and protests, youth organizations worldwide are calling upon governments to take action against climate change. They are also pushing governments and businesses to respond to climate change by actively engaging in climate action, such as organizing environmental activities and advocating for green living, as well as utilizing social media and environmental organizations to disseminate knowledge and raise public awareness on climate change. In recent years, youth participation and leadership in climate action has increased across a wide range of fields. Notably, among the first 100 typical projects selected globally by the Action Plan for Global Youth Development, 16 are in the “climate action and green development” field.

Major global climate platforms are placing increasing emphasis on the issues facing youth and their active participation in decision-making. The youth climate action organization YOUNGO under the United Nations Framework Convention on Climate Change (UNFCCC) provides youth with a voice in international climate policy, while the Conference of Youth (COY) currently serves as the largest and most content-rich youth conference related to the United Nations multi-lateral climate process. The Youth Empowerment in Climate Action Platform also provides young people with a safe and inclusive space to advocate for climate action in their respective countries. In addition, the United Nations

1 Authors of this chapter are: Zhu Yunjie, Yu Hongyuan, Ren Kanghua, Cheng Xingyu from Shanghai Institute for International Studies; Li Guangming from Tongji University; Yu Chuanyi from Sanda University; and UN-Habitat.

2 United Nations. Available at: http://rio20.net/wp-content/uploads/2012/06/N1238164.pdf.

3 United Nations. Available at: https://www.un.org/zh/climatechange/youth-in-action.

Development Programme (UNDP) supports youth participation in climate-related policymaking through its Youth for Climate Action initiative "Aiming Higher" focusing on the significance of youth participation in climate action within G20 countries, and "Youth-GPS" aims to promote the UNDP Youth Strategy. The United Nations Educational, Scientific and Cultural Organization (UNESCO) has also issued the Declaration on Children, Youth and Climate Action, and created the Youth UNESCO Climate Action Network, the Man and the Biosphere youth programme, Climate Change Youth Leader Camp, Youth Climate Summit and Global Youth Climate Week in order to support youth in creating and disseminating knowledge, enhancing their influence and participating in high-level climate activities. The United Nations Children's Fund (UNICEF)'s Youth for Climate Action initiative involves young people using their skills in education, technology, science and law to advocate for climate action. The World Economic Forum has also released the Youth Recovery Plan and supports youth-led solutions to help policymakers and youth interact in policymaking.

Governance under the cooperation of the global south and cities in developing countries now constitute a core focus of global climate action. The voices of youth, especially those from the global south and marginalized communities often remain on the periphery and largely unheard in global climate debates, whereby young people lack the resources, information, support and guidance required to make meaningful contributions to climate action. Young people have the right to have their voices heard on climate change issues and act as "accelerators" from advocacy to practice in climate action. From local to the United Nations level, youth representatives from the global south and developing regions must actively voice their opinions and seek policy support and resources. The younger generations possess innovation and vitality. They promote climate action through technological innovation and support the advancement/refinement of existing technologies such as scaling application of renewable energy as well as advocating for energy-saving and emission-reducing lifestyles thereby facilitating the dissemination of low-cost climate technologies in the global south.

This chapter on international cooperation highlights how multidimensional youth participation, south-south cooperation in youth talent cultivation, youth festivals in urban climate governance, climate conferences and dedicated actions by the United Nations effectively builds platforms for youth from diverse backgrounds to exchange ideas. These platforms provide stages for youth to demonstrate their problem-solving skills in addressing international issues like climate change, encouraging global youth to showcase their vitality in the practice of promoting a community with a shared future for humankind.

Case studies

Ho Chi Minh City, Viet Nam Multidimensional participation of youth in climate governance through cooperation between urban government and international organizations

Case background

Climate change has had a global impact and for many years Viet Nam has been one of the most affected countries. According to UNDP's annual assessment of extreme weather events from 1997 to 2016, Viet Nam is one of the five countries most severely affected by climate change and sea level rise[1]. It ranked fifth in the Global Climate Risk Index for 2018[2] and eighth in the Long-Term Climate Risk Index[3].

Viet Nam's economy is highly dependent on a few

1 Youth Climate Action Network. Available at: https://ynetvietnam.org/vys-2023.

2 Eckstein. D., Künzel. V., Schäfer. L. (2017) Global Climate Risk Index 2018 – Briefing Paper. Available at: https://www.germanwatch.org/sites/default/files/publication/20432.pdf.

3 Open Development Vietnam. Available at: https://vietnam.opendevelopmentmekong.net/topics/climate-change/.

sectors and has limited capacity for adopting emerging technologies, making it less resilient to climate shocks. Simultaneously, it faces multiple pressures from international transformation trends, national development goals and objective environmental crises. Achieving economic restructuring and ensuring the quality of life under climate threats requires substantial effort. As the country's largest city and economic hub, Ho Chi Minh City in the Mekong Delta region faces significant environmental and climate challenges. With the progress of global climate change, the city is exposed to multiple climate risks including sea level rise and extreme weather events, such as heavy rainfall, flooding and persistent high temperatures. Due to its low-lying terrain, sea level rise poses a significant threat to Ho Chi Minh City's infrastructure and residents. Frequent heavy rains and floods have already placed considerable pressure on the city's drainage system and transportation network, increasing the difficulty of disaster response.

Addressing climate change is an urgent issue requiring cooperative efforts and collective responsibility. As early as 2022, Viet Nam signed the Just Energy Transition Partnership with the G7 to aid in energy transition and build systemic resilience against climate challenges. However, with its high exposure to climate vulnerability, the country needs to set more ambitious goals, accelerating actions through a "whole-of-government" and "whole-of-society" approach, especially by involving the private sector and youth to build stronger climate defenses.

Youth enthusiasm for climate governance provides a unique advantage and powerful force for driving positive change. For instance, in 2019 the youth of Ho Chi Minh City participated in the global climate strike for the first time, calling for urgent climate action[1]. And in 2020, UNICEF, in collaboration with the Saigon Innovation Hub under the Ho Chi Minh City Department of Science and Technology, organized a climate action innovation showcase day[1] specifically for youth, see Figure 3.1.

Youth action often focuses on single activities or project plans and lacks complex capability models. Ho Chi Minh City, through cooperation with international organizations, guides the involvement of youth groups in policymaking, addressing the climate vulnerability issues of marginalized groups, youth activities,

Source: UNICEF. Available at: https://www.unicef.org/vietnam/press-releases/unicef-and-saigon-innovation-hub-incubate-socially-innovative-ideas-climate-action

Figure 3.1 UNICEF and Ho Chi Minh City youth climate action innovation showcase day

1 350+.org East Asia. Available at: https://world.350.org/east-asia/vietnamese-youth-demand-urgent-climate-action/.

information and technology sharing, and action-oriented collaboration[1], providing young people with a multidimensional capacity-building approach. This can help transform youth action from impulsive or herd behaviour into long-term effective collective action, and shift originally single-focused climate action into a comprehensive multidimensional action system.

Implementation process

Ho Chi Minh City's youth climate activities fully demonstrate the characteristics of cooperation between urban governments and international organizations. The government has taken a series of actions, such as the Youth for Climate Action in Viet Nam Special Report, Youth for Climate Action National Roadmap, Youth4Climate Learning Hub—see Figure 3.2, and the "Innovative Communication Solutions to Reduce the Impact of Climate Change and Increase Resilience to Disasters" Competition, leveraging opportunities for international cooperation to cultivate youth action capabilities in multiple dimensions.

The cultivation of youth activities in Ho Chi Minh City can be understood in four dimensions: enhancing credibility; strengthening participation; widening mobilization; and building capacity. The Ho Chi Minh City government and relevant United Nations agencies have promoted youth action by fully listening to youth opinions, respecting youth action, hearing youth perspectives and building youth capacities to make climate action and national contributions more youth-responsive and youth-led[2]. UNDP Resident Representative in Viet Nam, Ms Caitlin Wiesen, stated, "With our partners at MONRE [the Viet Nam Ministry of Natural Resources and Environment] and HCM [Ho

Source: https://www.undp.org/vietnam/press-releases/youth4climate-conference-unlocking-youth-potentials-and-innovations-implement-viet-nams-climate-change-targets

Figure 3.2 Presentation at a Youth4Climate Learning Hub

1 ASEAN. ASEAN Commemorates ASEAN Youth in Climate Action and Disaster Resilience Day 2021 with intergenerational dialogue [EB/OL]. Available at: https://asean.org/asean-commemorates-asean-youth-in-climate-actionand-disaster-resilience-day-2021-with-intergenerational-dialogue/.

2 UNDP. Available at: https://www.undp.org/vietnam/press-releases/youth4climate-conference-unlocking-youth-potentials-and-innovations-implement-viet-nams-climate-change-targets.

Chi Minh] Youth Union, we are determined to foster an enabling environment for young citizens to participate in the transition to a greener and cleaner future, and be one of the main driving forces in implementing the Paris Agreement and NDC [Nationally Determined Contributions] targets in Viet Nam."

1. Special report on official cooperation and authoritative endorsement of youth action

According to the 2021 Youth for Climate Action in Viet Nam Special Report as shown in Figure 3.3[1], about 60 percent of respondents believed that "information sources about relevant policies are still difficult to grasp" or "there is no reliable individual or organization that regularly updates and actively disseminates knowledge about climate change policies through media channels". Challenges, such as correctly understanding policy document language, finding reliable information sources and avoiding misleading speculation from unofficial information are difficult to overcome in youth action. The scant accessibility of information directly leads to a low level of youth participation or a narrow scope of participation, which has a negative impact on the sustainable development of youth activities.

The 2021 Youth for Climate Action in Viet Nam Special Report, drafted by UNDP in cooperation with the Department of Climate Change under MONRE, addresses the lack of support and information openness in youth climate action. This report, co-authored by 24 young writers from across Viet Nam,

Source: UNDP. Available at: https://climatelearning.undp.org.vn/wp-content/uploads/2023/02/Special-Report-on-Youth-for-Climate-Action-2022-Eng.pdf

Figure 3.3 The 2021 and 2022 Youth for Climate Action in Viet Nam Special Reports

1 UNDP. Available at: https://www.undp.org/vietnam/publications/report-youth-climate-action-viet-nam.

documents and tracks over 130 youth-led climate initiatives and projects. It covers youth participation in climate policy and decision-making processes to accelerate the transition to a circular economy, climate mitigation to achieve net-zero emissions, and climate adaptation and disaster risk reduction. It incisively analyses the challenges and responses of developing countries and climate-vulnerable regions in implementing climate adaptation actions. It also identifies several priority acceleration measures including establishing a youth climate policy working group, climate change education and capacity-building programmes, and funding and technical support for youth-led projects[1].

The report also facilitates better alignment between government and youth actions so as to accurately assess real demands and provide assistance, and helps to voice systematic youth perspectives from Viet Nam in the international community. By leveraging cooperation between the United Nations and the government of Viet Nam, the report helps to express the response of Vietnamese youth to worldwide climate action and enhance the international awareness of their activities. It also supplements government climate decision-making with youth perspectives, especially regarding the bottlenecks faced by youth climate action, providing targeted solutions and "recommended accelerators" from the perspectives of multiple stakeholders (e.g., national climate decision makers, local government councils, Ho Chi Minh Communist Youth Union and technical experts).

2. Formulating the Youth for Climate Action National Roadmap to establish mechanisms for youth and official collaboration

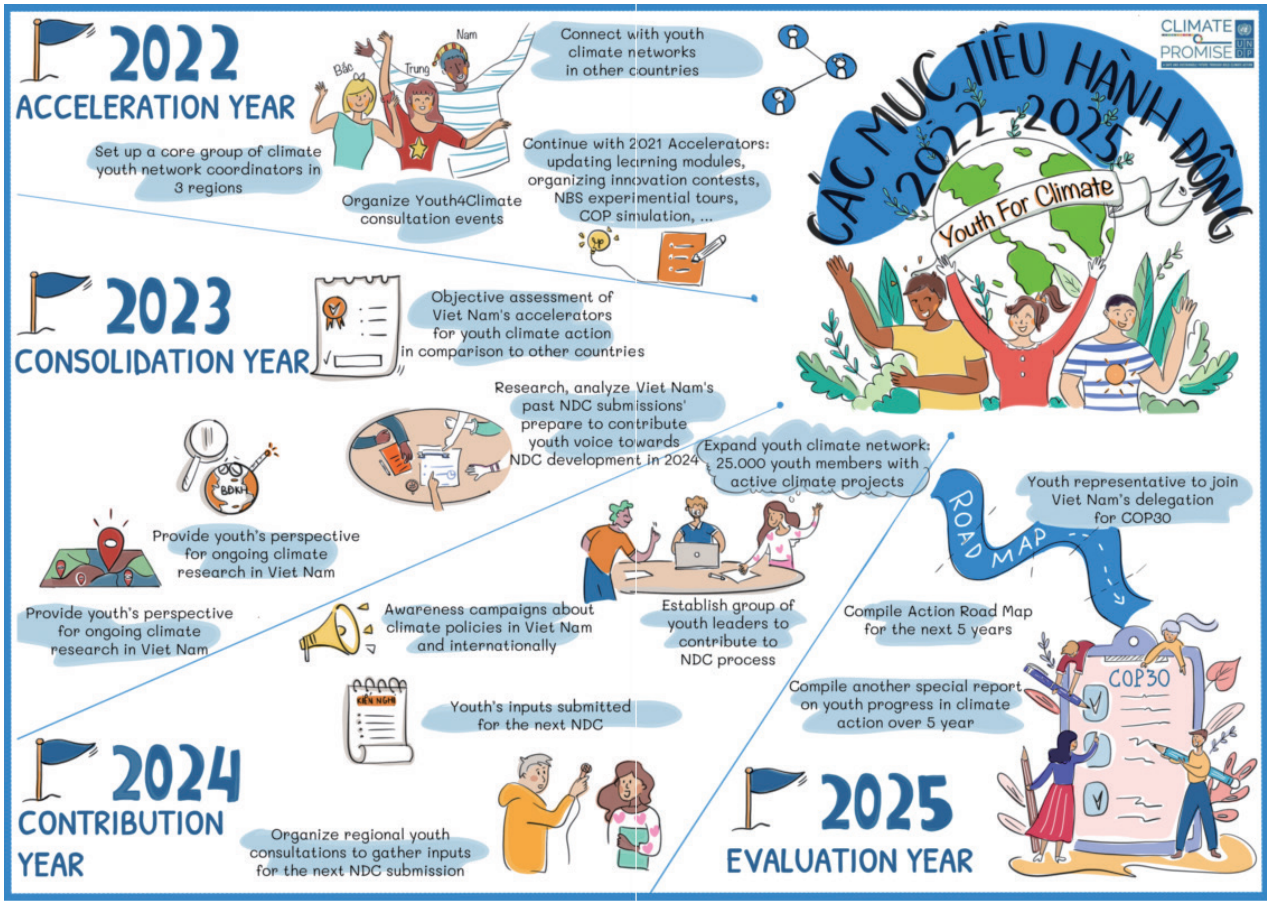
The Ho Chi Minh City government regards youth participation as a key consideration in governmental decision-making. By adhering to the established Youth for Climate Action National Roadmap as shown in Figure 3.4, mechanisms are set for collaboration between youth leaders and policymakers in implementing Viet Nam's National Data Centre with clear goals and milestones. The introduction of the Roadmap marks a shift from isolated individual actions to a series of collaborative actions involving youth groups, and international and domestic partners, providing guidance and phased tasks for subsequent youth action.

The formulation process of the Roadmap involved the participation of multiple stakeholders including youth representatives, government officials, non-governmental organizations (NGOs) and international organizations. Through extensive consultation and discussion, the Roadmap ensures a comprehensive reflection of the needs and opinions of all parties. This has resulted in a refined "youth + government" cooperation model, aligning the climate goals for 2020—2025 with youth action and providing foundational support for the orderly conduct of youth activities and the synchronization of national climate governance plans.

Youth have urged the government to establish favourable legal frameworks and foundations to support individuals, initiators, movements and youth organizations in taking climate action. These include creating enabling mechanisms to empower minority and marginalized groups and those directly affected by climate change. Most importantly, youth have recommended prioritizing the establishment of a Youth Climate Policy Working Group to represent youth voices at national and international policy forums.

The specific collaboration mechanisms include: (1)Youth Climate Policy Working Group: comprising youth representatives and government officials, this group holds regular meetings to discuss and formulate climate policies. It also coordinates resources to support the implementation of youth projects. (2) Cross-departmental cooperation: promotes cooperation between different government departments to ensure consistency between youth climate action and the national climate strategy. Through cross-departmental cooperation, challenges faced by youth in climate action will be jointly addressed. (3) International cooperation and exchange: active participation in international climate conferences and exchange activities, learning from

1 Youth Empowerment in Climate Action Platform. Available at: https://www.yecap-ap.org/compendium.



Source: https://www.undp.org/vietnam/publications/report-youth-climate-action-viet-nam

Figure 3.4 Youth for Climate Action National Roadmap (2021 version, partial)

and incorporating the successful experiences of other countries to enhance the international influence of Viet Nam's youth climate action.

3. Organizing climate action in various forms to raise youth awareness

Ho Chi Minh City supports and encourages more youth to continuously engage in climate action and innovative communication through the establishment of the long-term Youth Climate Action Network (YNet), thereby increasing societal awareness and action on climate change issues.

In January 2021, Ho Chi Minh City established YNet with 15 member organizations nationwide. YNet aims to support its members in applying for funding, collaborating with stakeholders, and organizing training and youth capacity-building programmes. YNet has organized numerous activities, such as: model United Nations climate change conferences aligned with the themes of the respective conference of the parties (COP); contributing to the drafting of youth statements representing Vietnamese youth voices before and during COY16 and COP26; ensuring the representation of Vietnamese youth in the Global Youth Letter on Climate Action and warming climate action; and organizing training programmes (e.g., warming climate action) to expand awareness of related activities among youth groups.

In 2022, Ho Chi Minh City hosted the Innovative Communication Solutions to Reduce the Impact of Climate Change and Increase Resilience to Disasters competition – see Figure 3.5, aiming to raise awareness among Vietnamese students, make innovations in risk communication and urge university students to

Source: UNDP. Available at: https://www.undp.org/vietnam/speeches/award-ceremony-innovative-communications-solutions-reduce-impact-climate-change-and-increase-resilience-disasters

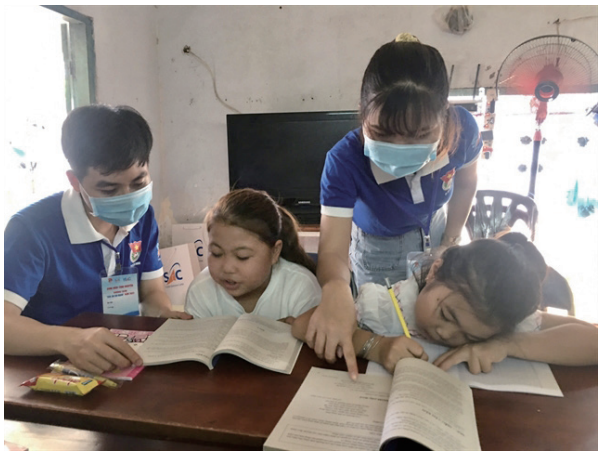
Figure 3.5 The ceremony of the Innovative Communication Solutions to Reduce the Impact of Climate Change and Increase Resilience to Disasters competition awards

take action to mitigate the impacts of climate change and enhance disaster resilience. The competition also highlighted best practices and successful models in the field, and called upon society to actively participate in reducing disaster risks and adapting to climate change. Entries were to be innovative communication products publishable on mass media (excluding radio), such as comics, short films, video clips, posters, etc. By employing diverse and creative initiatives, the competition attracted broad participation from youth and university students, inspiring them to incorporate climate change response into their self-awareness and lifestyles[1].

Additionally, the proposals submitted during the competition were not used merely for the contest purposes but, through international cooperation spearheaded by UNDP, conveyed critical information on disaster risk reduction and emergency response to vulnerable families in central Viet Nam.

4. Establishing learning forums and centres to empower youth climate action

Skills training is an indispensable part of youth climate action, especially in climate-vulnerable countries where the broad youth population lacks unified learning opportunities and centralized platforms for official policies, international situations, climate science documents and information. Officially leveraging international cooperation initiatives to build such platforms facilitates the flow of information between officials and youth groups, bridging the knowledge and skills gaps of young people in the climate field. Ho Chi Minh City has carried out a series of volunteering and learning activities to enhance the practical capabilities of young people participating in climate action, including the Green Summer Campaign Forum – see Figure 3.6 and Youth4Climate Learning Hub. These initiatives provide capacity training and financial support to empower youth in climate practice.



Source: Viêt Nam News. Available at: https://vietnamnews.vn/society/1254302/hcm-city-students-join-2022-green-summer-campaign.html

Figure 3.6 Scene from the 2022 Green Summer Campaign

For example, the Youth4Climate Learning Hub, part of the United Nation's Youth4Climate (Y4C) initiative, is entirely designed and developed by young people. The development team consists of young people from different regions and backgrounds in Viet Nam who have been working together under the support and peer review of technical and policy experts to develop knowledge modules. Each module summarizes core knowledge with striking images and combined informational content and creativity. To date, the

1 UNDP. Available at: https://www.undp.org/vietnam/speeches/award-ceremony-innovative-communications-solutions-reduce-impact-climate-change-and-increase-resilience-disasters.

hub has constructed five themes related to climate change (climate science, ecosystems and land use, energy, industrial processes, materials and waste, and climate policy), and has attracted approximately 600 participants who have completed courses on the website. It also contains over 100 reports and more than 20 articles on youth perspectives[1].

Reference experiences

Youth participation in climate governance and action, which mainly encompasses climate activism, education and communication, has already gained international academic attention[2]. The related actions in Ho Chi Minh City leveraging government and international cooperation involve these three areas. The nurturing behaviour that provides multi-dimensional conditions for local youth organizations is worth referencing by more climate-vulnerable countries. In the process of cooperation between the city government and international organizations, multidimensional youth participation in climate governance is beneficial for giving youth climate action clear purpose and practical abilities, and providing channels for consultation and platforms for innovative displays.

1. Governments should leverage international project cooperation to introduce youth groups as representatives of marginalized groups, directly involve them in specific governance actions, and encourage their innovation and leadership

In this project, Ho Chi Minh City has expanded the professionalism and extensive involvement of Vietnamese youth climate action in four dimensions: enhancing credibility; strengthening participation; widening mobilization; and building capacity. This effective behaviour responds to societal transformation demands by linking climate policy decision-making with youth action, translated into phased development goals. On the one hand, it gathers the joint efforts of various societal forces, and ensures the full mobilization and participation of youth; on the other hand, with the help of youth participation, the difficulty in implementing government climate policies is significantly reduced.

2. Cities can effectively enhance youth climate action capabilities through multi-dimensional cooperation with international organizations

Government and international organizations need to work together to provide youth groups with clear activity goals, activity spaces, capacity training, display procedures and actual channels for influencing government decisions. The training process for youth groups fills the public sector's inefficiency gaps, allows societal groups to spontaneously implement national policies, improves the effectiveness and feasibility of policies, and increases youth groups' understanding of national policies, thereby supporting subsequent implementation.

3. City governments can fully utilize international cooperation platforms to optimize diplomatic pathways and amplify communication effects

Youth groups, traditionally in a weaker position within societal power structures, have behavioural logic and focus areas that do not entirely overlap with traditional political elites. For instance, indigenous youth groups highly emphasize issues of ethnic and social value such as climate justice[3]. Introducing youth groups as representatives of marginalized groups to international project cooperation helps to implement the practical aspects of international cooperation and positively affects the innovation of subsequent activities and future career leadership. In this project, the Ho Chi Minh City government through various methods, such as YNet and Y4C, allows youth representatives to directly participate in international cooperation, such as the Global Youth Letter on Climate Action and Youth4Climate: Driving Ambition pre-COP26 event. This not only increases practical experience for youth activities but also serves as a voice for Ho Chi Minh City and even Viet Nam in the international community. Using youth voices to express national demands helps

1 UNDP. Available at: https://climatelearning.undp.org.vn/en/.

2 Wang Sidian: The Path and Characteristics of Youth Participation in Global Climate Change Governance, China Youth Study, Issue 6, 2023, pp. 24–32.

3 Jenny Ritchie. Movement from the Margins to Global Recognition: Climate Change Activism by Young People and in Particular Indigenous Youth [J]. International Studies in Sociology of Education, 2021, 30 (1–2): pp. 53–72.

to fully protect national interests. As youth action takes up an increasingly larger proportion of global climate action, introducing youth groups as representatives of marginalized groups to participate in specific projects helps to enhance the country's discourse power in corresponding climate action and lays the foundation for youth groups to continue climate action in the future.

Capacity-building for environment and sustainable development through South-South cooperation

Case background

With the deepening of globalization, the pace of international environmental governance is accelerating, accompanied by an increase in its intensity and complexity. The 1992 United Nations Conference on Environment and Development marked the beginning of a new era in international environmental governance. However, global capacity-building for environment and sustainable development still faces many challenges, including the difficulty in transferring technology and knowledge. Recipient countries of South-South cooperation often face issues, such as insufficient technical capacity, lack of professional talents and inadequate research infrastructure, which limit the absorption and application of technology and knowledge. Additionally, the instability of policy and institutional environments poses challenges to capacity-building for sustainable development, as the policy environment in recipient countries may be imperfect, affecting the smooth implementation of projects. Social and cultural issues are also challenges that cannot be ignored. Factors, such as social structure, gender equality, education level, social awareness and value differences in recipient countries, can have profound impacts on project implementation and outcomes.

In this context, Tongji University and the United Nations Environment Programme (UNEP) jointly established the UNEP-Tongji Institute of Environment for Sustainable Development (IESD) in 2002. As the only cooperative training institution of UNEP globally, IESD relies on Tongji University's strong environmental disciplines and is committed to cultivating talents with international vision and professional competence in the field of environment and sustainable development. Through 20 years of relentless efforts, IESD has not only achieved significant accomplishments in capacity-building for environment and sustainable development through South-South cooperation but has also constructed a benchmark global environmental governance talent training system and an international development platform with distinctive characteristics. The establishment and operation of IESD provides a successful model for addressing the challenges of global environmental governance and offers valuable experience for South-South cooperation countries. Through in-depth cooperation with international organizations, IESD has not only promoted the effective transfer of technology and knowledge but has also facilitated improvements in policy and institutional environments, and the positive integration of social and cultural factors, making important contributions to global capacity-building for environment and sustainable development.

Led by IESD, capacity-building for environment and sustainable development through South-South cooperation aims to enhance the comprehensive thinking and decision-making abilities of governments, international organizations, NGOs, private enterprises, and other organizations and industry practitioners in South-South cooperation regions, such as Africa and Asia-Pacific. It aims to cultivate their effective execution abilities based on the current state of sustainable development and guide them to consider the balance between environment and sustainable development in their decision-making. IESD has received several awards for this capacity-building project, including the "Special Contribution Award for South-South Cooperation" from the United Nations Office for South-South Cooperation, the "Green Talents Award" from the German Federal Ministry of Education and Research and the "Global Sustainable Development Silver Award" from Quacquarelli Symonds, an international higher education research institute. The online courses developed in cooperation with the United Nations Institute for Training and Research have surpassed 100,000 views. IESD has offered 30 interdisciplinary environmental courses, conducted 105 interdisciplinary social practices, launched 52 youth leadership courses, trained 436 international students

from 95 countries who came to study in China, published 225 academic papers, sent 150 people to participate in meetings and internships in international organizations, co-authored and published 33 international reports and textbooks with international organizations, and conducted approximately 4,000 person-times of domestic and international training sessions. Its platform construction model has been reported by mainstream media, such as *China Daily* and *Nature*.

Implementation process

Based on the framework of South-South cooperation, IESD has undertaken capacity-building for environment and sustainable development in over 50 countries across Africa, the Americas, Asia-Pacific and Europe. The specific implementation process is as follows:

1. Organizing the Asia-Pacific Leadership Programme on Environment for Sustainable Development

The Asia-Pacific Leadership Programme (APLP) on Environment for Sustainable Development was jointly initiated by Tongji University and UNEP in 2004. It also received strong support from the United Nations University, Yale University, University of New South Wales, University of Wollongong, Griffith University, Asian Institute of Technology, Nanyang Technological University and Hanns Seidel Foundation. This initiative formed the Asia-Pacific Sustainable Development University Alliance to facilitate discussions, refinement and innovation regarding the future leaders programme. The programme aligns with the United Nations Decade of Education for Sustainable Development (2005—2014) goals and serves Goal 4 of the SDGs to "ensure inclusive and equitable quality education and promote lifelong learning opportunities for all".

APLP on Environment for Sustainable Development is held annually at Tongji University, see Figure 3.7. It provides future leaders with sustainable development training covering human, environmental, social and economic dimensions, and promotes sustainable

Figure 3.7 APLP on Environment for Sustainable Development

development concepts through vivid case studies and interactive discussions. The programme enhances the systematic thinking and decision-making abilities of future leaders from governments, international organizations, NGOs, private enterprises and media in the Asia-Pacific region. It cultivates their effective execution capabilities based on the current state of sustainable development and guides them to consider the balance between environment and sustainable development in their decision-making. The programme aims to coordinate economic, social, environmental and sustainable development factors in order to solve complex practical problems and establish a platform and network for future leaders in the Asia-Pacific region to exchange ideas and jointly address regional sustainable development challenges.

Since 2004, more than 400 young people from 45 countries and regions have participated in and benefited from the programme, including over 30 countries in the Asia-Pacific region. The session has also attracted participants from Africa, Europe and North America to share their experience in the field of environment and sustainable development.

2. Committing to South-South cooperation in environmental talent training

IESD actively carries out project cooperation in the field of environmental talent training through South-South cooperation. This includes the Africa Water Action Plan to address climate change in Africa, South-South Cooperation China-Africa Green Cities Mayors Workshop, green city planning, degree education for African countries and the construction of university cooperation alliances. Among them, the China-Africa Green City Planning and South-South Cooperation Mayors Workshop, as shown in Figure 3.8, focus on sustainable cities, green city planning, the SDGs, emerging global environmental issues, energy efficiency and green buildings. Through reports and discussions, the workshop shares China's experiences, strengthens exchanges and communication, and highlights China's efforts and insights in practicing ecological civilization and green development. This

Figure 3.8 China-Africa Green City Planning and South-South Cooperation Mayors Workshop

aims to promote cooperation and mutual benefits between China and Africa in green development, providing strong support for South-South cooperation countries.

Since 2015, Tongji University has undertaken the Ministry of Commerce's foreign aid degree programme, enrolling 277 researchers and enterprise and government officials from 55 countries. For many years, IESD has been dedicated to building an advanced international education model and cultivating high-level interdisciplinary technical and management talents in the field of environment and sustainable development for regions and the globe, especially for countries along the route of the "Belt and Road" initiative. For instance, Mr Nega Fikru Alemu, a graduate of the Environmental Management and Sustainable Development programme, has returned to Ethiopia to serve as a Senior Expert in the Ministry of Innovation and Technology where he is responsible for advancing research initiatives aimed at addressing environmental challenges. He has also shared best practices in solid waste management at the Global Forum for Cities and Circular Economy. Mr Tefera, another alumnus, has taken on the role of Chief Executive Officer for Boundary and Transboundary Rivers at the Ministry of Water and Energy in Ethiopia, actively engaging in international collaborations including a joint project with China in the field of water resource management. South-South cooperation in environmental talent training not only enhances individual capabilities but also makes a substantive contribution to global environmental governance and the achievement of the SDGs.

3. Hosting the International Student Conference on Environment and Sustainable Development

In 2011, Tongji University and UNEP jointly established the "International Student Conference on Environment and Sustainable Development", see Figure 3.9. With strong support from the Agricultural Bank of China, Beijing Environmental Foundation for Young Talents and Xinhua News Agency, the conference has been successfully held 13 times. Nearly 10,000 students

Figure 3.9 International Student Conference on Environment and Sustainable Development

from over 50 countries have gathered at Tongji University each year on World Environment Day. The conference has become a grand global event focusing on future leadership in sustainable development and one of the most influential youth summits on sustainable development, providing a platform for global young students to exchange and discuss major environmental issues. It also offers cross-disciplinary, cross-field and cross-border learning opportunities for students interested in environmental protection.

The conference focuses on themes, such as human health, circular economy, climate change and zero-waste cities, showcasing the mission and responsibility of the new generation of youth in achieving ecological sustainable development. Each year, it attracts over 400 young people from more than 30 countries, with over 300 proposals competing.

Reference experiences

1. Strategically building a high-level "Point-Chain-Network" cooperation platform network

Through the sequential implementation of "Point-to-Point" "Point-to-Chain" and "Network-Style" international cooperation, a three-dimensional international cooperation network centred around IESD has been actively developed. Through Point-to-Point cooperation, IESD has established close ties with international organizations such as UNEP, ensuring the high quality and international recognition of its training programmes. Through a Point-to-Chain expansion, IESD has formed cooperative relationships with multiple countries and institutions across Africa, the Americas, Asia-Pacific and Europe, creating a global cooperation chain. Through Network-Style international cooperation, IESD has constructed a three-dimensional cooperation network that includes varied participants, such as governments, international organizations, NGOs and private enterprises, and spans multiple fields including education, research and policymaking. Multilateralism and enhanced cooperation are the consensus for global development. As the largest developing country, China's experience in environmental governance holds significant reference and demonstrative value for other developing countries. By building a high-level Point-Chain-Network cooperation platform centred on international talent cultivation, and sharing sustainable urban management technologies and experience, IESD has played a constructive leading role in the construction and advancement of a global community with a shared future for humankind.

2. Conducting coordinated multi-project training to cultivate interdisciplinary environmental governance talents for South-South cooperation

A comprehensive training system has been formed by integrating resources from APLP, South-South cooperation programmes for environmental talent development, the Ministry of Commerce's foreign aid degree programmes, and the International Student Conference on Environment and Sustainable Development. Participants are encouraged to engage in cross-disciplinary learning across different projects and strengthen the practical aspects of South-South cooperation projects. This allows youth from recipient countries to deeply engage in real projects, enhancing their ability to solve complex problems through hands-on practice and fostering their ability to apply learned knowledge flexibly in practice. The system promotes international cooperation in the field of sustainable development education with a more open attitude, encourages the sharing of quality educational resources and adheres to the principles of win-win cooperation, mutual learning and mutual reference. It also combines short-term training, competitions, seminars, mentor cultivation and international degree programmes to promote green sustainable development co-construction among governments, NGOs, academia and the private sector in South-South cooperation countries, thereby gathering a global consensus and exploring paths for global ecological civilization construction.

3. Enhancing localization and cultural adaptability to promote knowledge transfer and application

During the capacity-building process for South-South cooperation in environment and sustainable development, IESD emphasizes localization strategies and fully considers the social and cultural backgrounds, and actual needs of recipient countries to ensure that the training content and methods are adapted to local conditions. By working closely with local governments, communities and NGOs, IESD can better understand and integrate into local social

structures, values and behaviour patterns, thereby improving the relevance and effectiveness of its training programmes. This enhancement of localization and cultural adaptability not only promotes the effective transfer of technology and knowledge but also increases local communities' acceptance and participation in sustainable development projects, laying a foundation for efficient project advancement.

4. Building long-term mechanisms to promote continuous capacity-building for sustainable development

IESD focuses on building long-term mechanisms to ensure the longevity and impact of its projects in promoting South-South cooperation in environment and sustainable development capacity-building. Through establishing a network of partnerships, setting up scholarships and funding programmes, and providing follow-up tracking and support services, IESD offers participants continuous learning and development opportunities. IESD also encourages and supports participants to establish similar capacity-building platforms in their own countries, forming a mechanism for self-replication and expansion that promotes the continuous cultivation of sustainable development capacity-building. Such long-term mechanisms help to ensure that the outcomes of the training programmes can be translated into actual sustainable development actions, thus contributing to global environmental governance and achievement of the SDGs.

Prajatantra, India
A national youth festival on city governance

Case background

As the most populated nation on the planet, India is urbanizing rapidly with 52 percent of citizens under the age of 30[1]. Youth also reflect the largest portion of Indian demography that are not formally educated on the structure and function of municipal governments. In the absence of this knowledge, young people lack a sense of interest and responsibility to participate in local government processes, leaving municipalities across the country void of innovative youth-led urban solutions. Beyond the theoretical understanding of governance structures, youth also lack access to opportunities in which they can practice associated learnings and actively engage in local governance, particularly in regard to a lack of civic engagement tools and platforms.

Prajatantra is India's premier National Youth Festival serving as a platform for youth across the country to advocate their beliefs, opinions and understanding of city governance through debates and discussions, facilitating youth engagement and participation at the national level. First launched in 2019, the annual festival encourages participants to form and function as a model municipal government through immersive experience such as mayor's speeches, policy presentations, debates and quizzes. Accordingly, Prajatantra is serving to nurture the next generation of youth to become dynamic civic leaders. The Praja Foundation has been working to enhance citizen participation in local governance for the last 26 years with the core objective to enhance youth inclusion in local governance beyond simply voting capacities. To drive this engagement, the Praja Foundation, in cooperation with the Urban Youth Unit of the National Institute of Urban Affairs with the support of UN-Habitat and the Friedrich Naumann Foundation for Freedom South Asia, organized Prajatantra 2023.

Implementation process

1. Preparing festival participants through a bootcamp and knowledge sessions

On 6 August a bootcamp was held for all participating teams and colleges themed around "inclusive and participatory urban economies", see Figure 3.10. Tasked to provide clarity and knowledge on the various events happening in the festival while addressing any questions from participating teams, the bootcamp served as an all-encompassing orientation session

1 University of Delhi: Sri Vekateswara College. Available at: https://www.svc.ac.in/SVC_MAIN/SeminarsWebinars/Prajatantra%202023_Concept%20Note.pdf. (Accessed: 13/07/2024).

Source: LinkedIn–Praja Foundation. Available at: https://www.linkedin.com/posts/praja-foundation_prajatantra-bootcamp-events-activity-7096716120824381440-q_gr/?trk=public_profile

Figure 3.10 Youth participate in the Prajatantra 2023 bootcamp session

in which participants were informed on the events and competitions within Prajatantra along with the rules and regulations. To further prepare participants, knowledge building represented a fundamental cog. Four knowledge sessions were facilitated between August to October to equip grand finalist participants with a foundational understanding of local policymaking for the competition. As an important means to enhance their skills in local governance, these sessions were designed to encourage deeper interrogation as to the intricacies of policy development among participants.

The first knowledge session focused on the legal and institutional frameworks of city governance covering elements, such as the functions of municipal corporations, the significance of municipal acts and the intricacies of mayoral election. The role of and responsibilities of mayors within the administrative landscape of municipalities was also discussed as well as the 74th amendment act and its key role in the national governance framework. The second session centred on the role of youth to ensure water secure urban ecosystems. Water management projects implemented in Ahmedabad were also discussed, highlighting a number of projects showcasing how Indian cities are tackling issues such as flooding and water scarcity, and how youth can play a key role in these processes. Thirdly, a session was dedicated to funding, providing insights into the fundamental concepts and general trends on municipal financing in India, and the importance of citizen participation in local government. And the fourth session covered inclusive urban spaces for resilient urban economies whereby expert speakers explained the connection between inclusive and diverse public spaces and urban economies globally, demonstrating the potential for municipalities to leverage unique public spaces to enhance urban economic prospects.

2. Capacity-building through interactive competitions

Structured under several rounds, the festival consisted of initial qualifying rounds which ran from 1 to 3 September followed by semi-finals from 16 to 17 September. The grand finale took place over three days from 30 October to 1 November. It featured six non-competitive events that were designed to emphasize the importance of community-building, and ideas and

cultural exchange between grand finalists, exposing them to wider opinions on urban society, citizenship and governance. Events included: knowledge sessions; reel retreats hosted in collaboration with Ashris Choudhary, the Founder of India in Pixels; Prajatantra UnPlugged in cooperation with Youth Alliance; a networking dinner; a cultural night; and a visit to the Indian parliament.

As part of the Mayor's Speech competition, the mayor presented the policy framework of the municipal government for their upcoming term, indicating decisions and key changes in the administration structure. Candidates from different municipalities were invited to present their perspectives on issues related to their communities, and the grand finalists were tasked to address local challenges, propose innovative solutions and inspire others to take action via urban policy, good governance and forward-thinking approaches. While the competition transferred knowledge to youth on local governance mechanisms within India, it also served as a platform for individuals to voice their concerns, share their visions for cities and municipalities, and advocate for positive urban transformation through hands-on experience in city cooperation meetings. The competition therefore sought to enhance leadership skills among participants and provide them with insight into developing comprehensive urban development visions.

Focused on municipal financing and urban economies, policy presentations were conducted to guide participants to think innovatively about budgeting, and present unique ideas regarding fund allocation and economic planning in their respective urban local bodies. A number of ideas were raised including the introduction of carbon credit systems and e-bikes to ensure sustainable low-carbon economic development, tax incentives and grants for startups, small businesses and industries to create local job opportunities as well as sustainable tourism promotion. Participants also proposed the potential for municipal bonds to generate revenue, public transport investment to alleviate congestion and boost revenue, and solid waste management charges. The competition played an important role in enhancing conceptual knowledge surrounding local policymaking and budgeting, and encouraged analytical thinking in response to urban governance challenges. Presentations focused on the comprehensive economic development of cities, and factors such as migration and the sociocultural resources which impact policy frameworks. Policy debates, see Figure 3.11, were also carried out,

Source: Photo from UN-Habitat

Figure 3.11 Youth members participate in the Prajatantra 2023 policy debate competition

centred on urban policy and governance via formal and systematic discussions. These activities offered participants the opportunity to critically analyse and discuss current urban affairs across social, cultural, political and economic dimensions, facilitating solutions-oriented approaches. Debates were conducted in line with the formal procedure exhibited in India's local governments whereby participants were divided into government and opposition sides to either favour or oppose the motion "should city government only be a service delivery agency or are they responsible for economic development". Featuring three rounds, a quiz competition further assessed participant knowledge across a range of topics related to urban governance, encompassing areas such as citizen participation, e-governance, the constitution and climate change to foster learning and active engagement.

3. Initiating field engagement activities

Prajatantra 2023 included field activities for participants for the first time. Field engagement was designed to provide grand finalists with an improved understanding as to the functioning of city governance. Activities were divided into two phases. In the first phase, participants conducted comprehensive reviews on urban economic policies in their respective municipalities and mapped urban economic profiles, studied the city government website and analysed the Municipal Corporation Act. The second phase centred on field visits, see Figure 3.12, and citizen surveys where participants directly interacted with administration officials, elected representatives and citizens. These interactions produced valuable insight into the implementation of urban economic policies and the effectiveness of service delivery at the local level.

Source: Photo from UN-Habitat

Figure 3.12 Participants of the field visit to the Indian Parliament post grand finale of Prajatantra 2023

In its five-year journey, Prajatantra has achieved a strong pan-India network of youth academic institutes as well as youth community groups. Prajatantra 2023 alone brought together 343 registered teams across India with students from 106 municipalities. Participants also represented 202 academic institutes and 7 civil society organizations (CSOs) working explicitly with youth communities. The event was established as a result of the collective effort of 433 virtual meetings, over 100 volunteers and the expertise of over 123 judges, actively involving 1,919 urban youth. Participants reflected a diverse demography, covering all youth age groups from high school graduates to mid-careers master's students with educational backgrounds in engineering, architecture, media studies, medicine, social sciences

and humanities. Such diversity stimulated a dynamic peer learning process where the festival reached a total of 5,377 youth directly and 26,885 indirectly along with 2,376 academic institutes and CSOs[1]. As a launchpad for next-generation leadership, learnings on city governance and policymaking in Prajatantra are optimized by participants to generate academic and career decisions where initiative actions are serving to strengthen urban governance. It is important to note, however, that to further enhance Prajatantra, institutionalization through academia or governmental bodies will help the initiative to transition to a more sustainable forum educating youth on participating in local governance. Meanwhile, the reach of the festival can be increased by adopting a decentralized structure where institutes from different municipalities can host local editions that will facilitate grassroots integration and participation.

Reference experiences

1. Facilitate direct cooperation between urban youth with municipal actors

As a collaborative platform that bridges urban youth and municipal government actors, Prajatantra showcases the value of developing spaces for mutual learning and exchange. Urban policymakers and decision makers provide expert knowledge for youth participants, while urban solutions proposed by participants also spark new ideas and ways of thinking among mayors and municipal actors. Where many local governments in the global south, in particular, are subject to a lack of youth engagement in local development processes, it is especially pertinent to facilitate such cooperative initiatives that foster two-way dialogue to close the gap regarding youth participation and help initiative traction for inclusive and forward-thinking governance. Where young people are at the forefront of developing transformative urban climate solutions, Prajatantra can inspire youth innovation and cooperation in this arena, serving as a model platform to empower them in local climate action.

2. Leverage immersive activities such as role-playing to build capacity and stimulate youth engagement in urban governance

Prajatantra exemplifies the value of building interactive forums as a means to drive youth engagement and build their knowledge and skills in municipal governance. Via direct exchange with experts and municipal government actors, the festival underscores the significance of educating young people in policymaking and governance processes, promoting innovative youth-led solutions through active participation and dialogue. By simulating real-world local government scenarios, role-playing allows young people to experience municipal landscapes and decision-making processes, understanding the associated complexities. By taking on different roles and engaging in productive debates, the festival demonstrated how youth can appreciate diverse viewpoints and the impact of urban policies across different stakeholders and communities whereby engagement in real-life governance scenarios encourages strategic thinking and innovative solutions. In addition, such activities promote teamwork, negotiation and public speaking, all of which are essential for effective civic participation and core skills required for young people in order to become impactful urban change-makers. Connecting participants from a wide range of municipalities and backgrounds across India, Prajatantra therefore acknowledges young people as the architects of cities, guiding the future trajectory of urban development. As such, the initiative serves as a dynamic tool for national cooperation on youth inclusion in local governance, driving their participation and providing them with a voice in municipal decision-making.

1 Praja Foundation. Available at: https://www.praja.org/praja_docs/praja_downloads/Prajatantra%20Samvad%202024_Issue%2003.pdf.

Rome, Italy
Youth4Climate: Sparking Solutions Event

Y4C is a global initiative co-led by the Government of Italy and UNDP. The Youth4Climate: Sparking Solutions 2023 global flagship event was held in Rome from 17–19 October 2023, connecting 130 young people from 63 countries, see Figure 3.13. The event aimed to showcase youth-led solutions, foster cooperation and learning, promote the dissemination of key resources and tools from partner organizations, and engage key stakeholders in climate action discussions. Structured as an innovation challenge focused on supporting the work of young people and youth-focused organizations, a first ever "Call for Solutions" was launched from October 2022 to March 2023 between Y4C and its strategic partners. The process aimed to foster innovative approaches to climate action and offer seed funding of up to USD 20,000 for solutions across areas of (1) climate education. (2) Energy. (3) Food. (4) Agriculture. (5) Urban sustainability.

Source: UNDP. Available at: https://climatepromise.undp.org/news-and-stories/young-people-present-100-climate-solutions-rome

Figure 3.13 Youth attendees of the Youth4Climate: Sparking Solutions 2023 global flagship event

Over 1,100 project proposals were submitted, with 100 shortlisted and presented by youth participants as shown in Figure 3.14. Importantly, finalists were afforded the opportunity to pitch their projects in front of a selection panel and fellow participants, whilst partaking in peer-to-peer and cross-generational learning. A diverse number of solutions across the four focus areas were proposed including: green jobs promotion; curriculum enhancement on climate action; improved information products; sustainable waste management; and disaster risk awareness as well as: calls for agroecology promotion; organic

Source: UNDP. Available at: https://climatepromise.undp.org/news-and-stories/young-people-present-100-climate-solutions-rome

Figure 3.14 A youth participant delivering a presentation on urban sustainability

farming and drip irrigation technology; urban resilience building; and enhanced clean energy access and storage technologies. Critically, the pitching sessions showcased a strong sense of unity between participants with collaboration and mutual learning about different projects and potential cooperation to help reach common goals of tackling climate change challenges. A total of 50 projects were awarded funding with support for winning solutions given via learning offers such as mentorship programmes, peer-to-peer exchange and for courses furnished by partners including the United Nations Global Compact to enhance the skillset required for young people to lead the green transition.

A range of sessions were conducted including a world café deep dive conversation which allowed participants the platform to critically explore challenges and opportunities for youth-led initiatives and the necessity for partnership development and mutual cooperation. An open dialogue session further enabled participants to reflect on the various elements of climate justice from diverse perspectives such as Indigenous Peoples and young people from conflict-affected contexts, exploring issues such as gender equality, youth activism and the green transition. Youth were also afforded the opportunity to engage directly with United Nations officials including the Deputy Secretary-General of the United Nations Ms Amina Mohamed and the Administrator of the United Nations Development Programme Mr Achim Steiner, in addition to Italian Government high-level officials including the Minister of Foreign Affairs, the Minister of Environment and Italy's Special Envoy for Climate Change. The Youth4Climate Engagement Platform also serves as an online space dedicated to youth and climate providing discussion space, innovative and co-developed capacity-building programmes, webinars and networking opportunities. As an active tool, the platform hosts more than 7,000 members consisting of young people from all regions globally.

Dubai, the United Arab Emirates COP28

Serving as the sole multi-lateral decision-making forum on climate change with membership from almost every country in the world, COP marks a momentous occasion in assessing and accelerating global progress on climate change. Held in Dubai, the United Arab Emirates from 30 November to 13 December 2023, COP28 convened an unprecedented mobilization of stakeholders and undertook the first stock take of global efforts on climate action, strengthening international climate cooperation at national and sub-national levels. While it focused on primary challenges including the mitigation of urban emissions, enhancing climate resilience, promoting sustainable urban development and mobilizing finance for climate action at the local level, several key actions were implemented to promote youth-led climate action notably the negotiation of the Youth Climate Champion (YCC), see Figure 3.15, as well as the selection of youth delegates.

Building on the foundations of the COP27 Youth Envoy, YCC was developed to serve as the missing connection between the COP Presidency and youth stakeholders, while also streamlining coordination

Source: UNFCCC. Available at: https://climatechampions.unfccc.int/the-climate-champions-youth-fellowship-2024/

Figure 3.15 Youth Climate Champions at COP28

among youth, governments and UNFCCC. Tasked with mainstreaming youth participation and youth voices into the COP28 process, the institutionalization of the role of the Presidency YCC within the UNFCCC process works to enhance meaningful cooperation and representation in future COPs. To increase youth participation from underrepresented groups in climate change policymaking, the COP28 Presidency United Arab Emirates announced the selection of 110 delegates for the International Youth Climate Delegate Programme to integrate them into the COP process. Youth delegates were prioritized from countries on the list of Least Developed Countries, Small Island Developing States, Indigenous and conflict-affected communities as well as those with disabilities around the world. The programme marked the largest initiative to expand youth participation in international climate negotiation processes to date, providing delegates with robust capacity-building and full funding to participate in COP28.

UN-Habitat spearheaded several initiatives to elevate the role of cities in climate action including the Local Climate Action Summit (LCAS) and the Ministerial Meeting on Urbanization and Climate Change. LCAS featured more than 500 attendees from over 60 countries and launched the Coalition for High Ambition Multilevel Partnerships, fostering collaboration between national and subnational governments. Commitments were secured from 72 national governments to enhance collaboration in climate action planning and in the planning, financing, implementation and monitoring of Nationally Determined Contributions (NDCs). LCAS highlighted the potential of high-level

events to strengthen collaboration and accelerate climate action between cities and urban actors at the international level, and critically, builds a mechanism to gather ideas for climate action at the local level, aiming to ensure that the next iteration of climate targets are as inclusive and ambitious as possible. In addition, UN-Habitat co-convened the Multilevel Climate Action and Urbanization Pavilion, gathering over 2,000 participants to strengthen global efforts in addressing urban focused climate challenges. The Pavilion highlighted not only the challenges and needs but also the accomplishments and commitments of local and subnational actors on climate action and instilled the foundations for strengthened collaboration and continued multi-level climate action for COP30 and enhanced action on NDCs in 2025.

Policy suggestions

1. Integrate youth into urban governance networks, understanding them as indispensable and vital actors to ensure sustainable urban development

Youth sensitivity to climate issues deserves significant attention within current international governance networks. A review of youth participation in urban governance networks during international cooperation has revealed that the role of youth as "whistleblowers" offers valuable insights for current climate adaptation actions. Today's climate actions not only need to pursue more ambitious climate goals but also efficiently collect and present youth voices and perspectives within urban management. City governments should actively engage international organizations, city-to-city exchange projects and media platforms to invite youth participation in communication processes. At the international level, there should be a further emphasis on promoting projects such as "Youth Action Reports", "Youth Opinions on Climate Arbitration" and "Nurturing Youth Climate Leaders" within platforms such as the United Nations, international organizations and university alliances. The journey of youth participation in global climate governance has been intertwined with the history of international negotiations at the annual conferences of UNFCCC, and today there are a multitude of youth climate networks. Organizations and alliances such as the European Youth Forum, SustainUS, the Energy Action Coalition and the China Youth Climate Action Network can provide crucial information in governmental climate governance processes. Cities should also leverage international network campaigns, coupled with local youth dialogues and cooperation to uncover hidden challenges in urban climate governance.

2. Enhance youth climate action capacity-building by developing multi-level, multi-sector and cross-regional youth training programmes

The future of youth climate action appears relatively optimistic with expanding space for action, opportunities for participation and action pathways. However, as a disadvantaged group among the many stakeholders in climate issues, the contrast between youth enthusiasm and their capacity for action is particularly striking. Current youth climate participation needs to shift from advocacy, appeals and communication ("voicing") to a focus on technology, law and policymaking ("acting"). Their professional capacity on climate issues depends on targeted capacity-building. Firstly, youth climate skills training is necessary to equip young people with the technologies and methods needed to tackle climate change. Secondly, academic exchange on climate issues should be promoted, encouraging youth participation in international and regional climate conferences and forums to broaden their perspectives and deepen their understanding. Thirdly, supporting internships and work opportunities within climate organizations allows young people to directly engage in the formulation and implementation of climate policies. Local governments should actively initiate and support youth-led climate actions to facilitate the transition from theory to practice. And fourthly, the integration of new concepts such as refined urban governance and agile urban governance also requires young people to familiarize themselves quickly to meet the practical and urgent needs of climate governance.

3. Leverage the organizational and mobilization capabilities of youth to lead climate actions

Youth are playing an increasingly important role in international climate governance, primarily due to their straightforward, linear and agile thinking processes, combined with their powerful organizational and mobilization abilities. The active involvement of the youth is a key factor in driving climate improvement, just as the SDGs aim to create a more livable environment for future generations. Climate actions that start from the interests of young people themselves can help address the collective action dilemmas currently facing global climate governance. The vibrant activism of youth also serves as a powerful tonic for climate ambition.

Chapter 4

Economy: empowering youth to drive green economic development

Introduction[1]

Climate change is increasingly impacting economic security through extreme weather events and persistent resource scarcity, such as energy crisis and declining agricultural output. As adaptation is as important to climate action as mitigation, transitioning to a green and net-zero economy is a shared goal for countries worldwide.

There is a synergistic relationship between climate action and green economic development. Climate action – mitigating and adapting to climate change by reducing greenhouse gas emissions, enhancing carbon sinks and promoting low-carbon technologies – directly contributes to the growth of the green economy. The green economy, centred on sustainable development, emphasizes efficient resource use, reduced environmental impact and economic growth. Through climate action, the green economy is propelled forward, creating new job opportunities and growth in areas such as renewable energy, green buildings and the circular economy. Additionally, ecological restoration is a crucial component of climate action as restoring degraded ecosystems enhances the capacity of natural carbon sinks, which further reduces atmospheric CO_2 levels. For example, the restoration of wetlands can significantly increase carbon storage capacity, thereby mitigating the impacts of climate change. Ecological restoration also fosters green economic growth, particularly in sectors such as eco-tourism and sustainable agriculture, injecting new vitality into local economies.

Young people, as the future of society, play an indispensable role in addressing climate change and driving green economic development. Data shows that youth around the world are more concerned about climate change than ever before. According to a 2022 survey by UNDP, over 70 percent of young people view climate change as one of the greatest challenges facing humankind today. The International Labour Organization indicates that by 2030, the green economy will have created 24 million jobs globally, with a significant portion held by young people[2]. The power of youth is not only reflected in their concern for climate issues but also in their efforts to drive concrete action. Globally, more and more youth organizations and individuals are actively promoting climate action through social innovation, entrepreneurial practices and policy advocacy.

This chapter will explore specific cases of how youth power drives climate action and green economic development, and how to better support and inspire youth to play an active role in this field, thereby making a greater contribution to global efforts to address climate change and achieve the SDGs. It will present the multi-dimensional roles of youth in promoting climate action and green economic development through three case studies and two boxouts covering areas such as the urban circular economy, ecological restoration, the green economy, community sustainable development, and low-carbon community building and social participation. The selected examples not only cover different urban contexts and development stages, but also provide specific implementation paths and highly operational successful experiences for other cities worldwide. Through these examples, the chapter delves into how youth, through innovation and action, can address climate change and drive the global economic green transition from both the macro and micro perspectives.

The case study of Johannesburg, South Africa highlights the role of youth in waste management and the recycling economy. Through the Separation@Source Programme, Johannesburg has engaged residents, particularly young people, in waste sorting and recycling, driving the city's transition to a low-carbon and green economy. Youth in

1 This chapter was jointly written by the team from the Institute of Urban Development at East China Normal University (ECNU) and UN-Habitat. The ECNU author team includes Zeng Gang, Zhu Yiwen and Guo Yingke. The Johannesburg case study and the Lagos case study were written by UN-Habitat. The Jiujiang case study was contributed by the Ministry of Housing and Urban-Rural Development of China.

2 United Nations. UN News. Available at: https://news.un.org/zh/story/2018/05/1008622.

Johannesburg have become active advocates in the waste sorting process and created new green job opportunities for themselves through innovation and entrepreneurship in the recycling industry. The value of this case lies in demonstrating how recycling economies can drive sustainable urban development and provide a feasible path for other cities to follow in the recycling economy.

The case study of Cuihu Park in Kunming, China highlights the unique advantages of young researchers and universities in ecological restoration. Through the "Youth Partnership" model, Kunming successfully restored the ecosystem of Cuihu Park, enhanced biodiversity and promoted the park's sustainable development. More importantly, this mechanism not only improved the ecological environment but also generated significant economic benefits through the integration of culture and tourism, attracting a large number of visitors and enhancing Kunming's cultural influence. This case study demonstrates how youth power, through scientific innovation and collaboration, can achieve a win-win situation for ecological restoration and economic development, providing valuable insights for global cities in similar contexts.

The Coletivo Nossa Horta (Our Garden) project in Rio de Janeiro, Brazil illustrates the importance of youth in urban agriculture and community sustainable development. Initiated by young volunteers, this project has established community gardens in the city, improving local food security and strengthening community cohesion and environmental sustainability. Through innovative agricultural practices such as "keyhole gardens", the youth involved in the project have not only improved the environment but also provided economic support to local residents. This case shows how youth can combine environmental and economic sustainability through community-driven models to promote the development and green transformation of impoverished communities.

In Lagos, Nigeria the critical roles of youth and women in recycling programmes is discussed. Through the Recycling Scheme for Women and Youth Empowerment (RESWAYE) programme, youth of Lagos have improved the community environment through waste recycling and achieved financial independence through the recycling business. The programme has helped young people and women to enter the recycling industry, creating a large number of green jobs and improving their quality of life. This boxout demonstrates how empowerment and education can unlock the potential of youth in the recycling economy and drive both environmental and economic development.

And the Jiujiang, China boxout emphasizes the positive impact of youth on low-carbon community building. By establishing youth-friendly low-carbon park communities, Jiujiang has not only improved the quality of life in the community but also promoted the application of green energy and sustainable development. The active participation of youth in community governance, environmental protection and social services shows how a co-building and co-governance model can achieve green community transformation and economic development. This example showcases the leading role of youth in community governance and provides practical experience for other cities in building low-carbon communities.

Climate action and green economic development are central to global sustainable development, and youth, as the most innovative and dynamic social group, are not only the inheritors of the future but also the promoters of the present. Their active participation and innovative practices have injected new momentum into achieving carbon neutrality and driving the global economy's green transition. Therefore, exploring how youth power drives climate action and green economic development in this chapter is not only of urgent and significant relevance, but also offers valuable experience and references for other countries and cities.

Case studies

Johannesburg, South Africa
The Separation@Source programme: transitioning to a recycling economy

Case background

With the largest dynamic economy in Africa, Johannesburg is the most rapidly expanding city in the continent with an expected population of around 7 million residents by 2040[1]. The city generates over 1.6 million tons of waste every year and recycles just 15 percent, but with the anticipated population increase this could translate to 3.1 million tons of waste annually[1]. With finite capacity, landfill space across the city has rapidly depleted with some projections indicating that the continuation of conventional waste disposal methods would result in the fulfilment of their maximum capacity by 2023. Unsustainable waste disposal methods have therefore posed significant challenges not only in regard to logistics, but also environmental impacts such as elevated greenhouse gas emissions and land contamination.

South Africa's National Waste Management Strategy sets targets for metros, secondary cities and large towns to implement "separation at source" programmes in which waste generating households and businesses separate recyclable from non-recyclable waste. In light of the dwindling landfill capacity, Johannesburg initiated action to divert waste away from landfill sites towards regenerative waste management solutions centred around recycling and recovery in line with national policy. Instigated by Pikitup, the city's official waste management service provider, the Separation@Source programme was rolled out on a voluntary basis in 2009 in certain parts of Johannesburg and made mandatory on 1 July 2018. The city has since actively facilitated the extension of the programme to establish a systematized waste management model, catalysing a shift from waste avoidance and reduction towards waste re-use, recycling, recovery, treatment and disposal. The programme now functions as a core driver of Johannesburg's waste minimization plan which aims to divert 93 percent of its urban waste away from landfills by 2040[2].

By promoting the shift to recycling in line with circular economy principles, Pikitup has sought to intensify both new and existing waste management programmes, developing the necessary processes and infrastructure to facilitate a low-carbon and green economic transformation. In addition, it aims to contribute to the alleviation of unemployment, poverty and inequality, whilst improving environmental quality by reducing greenhouse gas emissions, conserving natural resources, saving energy and creating new green jobs. As a key objective, the programme works to introduce recycling to youth to ensure that they grow up with these practices as engrained behaviours in an effort to cultivate younger generations that are waste conscious.

Implementation process

Harnessing the capacity of the private sector, Johannesburg commenced collaboration in 2017—2018 to expand the roll-out of the Separation@Source programme to additional parts of the city. As important partners for successful implementation, private sector corporations have played a key role in supporting and empowering small, micro and medium sized enterprises (SMEs) via financial and infrastructure contributions to aid their entry into the recycling sector. This has unlocked new green job opportunities for young people and disadvantaged groups alike. Pikitup now employs over 4,500 people, using more than 200 trucks to provide refuse collection services for both residents and private businesses across the city[3]. In addition, established industry recycling groups have

1 Metropolis. Separation at Source (S@S) programme in the City of Johannesburg. Available at: https://use.metropolis.org/case-studies/separation-at-source-programme-ss#casestudydetail.

2 Sustainable Cities Collaboratory. Available at: https://www.citiescollaboratory.org/city/johannesburg/.

3 City of Johannesburg. Available at: https://www.pikitup.co.za/?page_id=2347.

initiated relevant training to community businesses across aspects such as business and operations management as well as recycling techniques.

1. Building a network of waste drop-off facilities

Built upon a cooperative community model, the Separation@Source programme is made possible via the participation of urban residents who sort their household waste using a "3-receptacle model" consisting of: (1) dry recyclables; (2) organic waste; and (3) non-recyclables. To manage recyclable items, the city operates two programmes – kerbside collection and drop-off at site recycling.

To ensure a simple and clear process, Pikitup issues households with specific bags for paper and other types of recyclables to ensure these items are clearly separated from other household waste. The recycling bags are collected weekly in separate trucks on the same day as other household waste collections.

A network of drop-off facilities have also been established across the city to enable communities to deliver their dry recyclables for re-use, recycling and further processing, see Figure 4.1. Recyclable materials are sorted at these communal collection points via small, medium and micro-sale enterprises. To ensure recycling is accessible for all, the communal collection points are user friendly to allow all citizens, including children and disabled persons, to safely deposit waste into receptables. Pikitup provides the fleet, a supply of bags and additional supporting infrastructure including sorting areas to facilitate the programme. Currently 37 cooperatives contribute towards innovative value creation from waste material.

Source: City of Johannesburg. Available at: https://www.pikitup.co.za/?page_id=3312

Figure 4.1 Dry recyclables are sorted within a waste sorting centre

Pikitup also operates 44 garden refuse transfer sites providing containers for the disposal of organic and biodegradable light garden waste, maximizing the amount of green waste kept out of landfill sites.

Both traditional and private sector operational models are used for the collection of dry recyclables from residents. The traditional model is community-based and includes a number of cooperatives that offer collection of dry recyclables and a sorting service to residents who are registered with Pikitup. The private sector model comprises of service providers who provide dry recyclable material collections paid for by Pikitup. These service providers procure, deliver and collect filled bags from residents and operate their own sorting facilities. To encourage a recycling culture among all residents both models also run education and awareness programmes within the serviced communities.

Where rubble constitutes a large proportion of waste, Pikitup has allowed building contractors to dispose of clean rubble at two specified sites: the Marie Louise Landfill and the Robinson Deep Landfill starting in early 2023. Operating as a free service, the action was taken to help combat illegal dumping – a major waste management challenge in the city contributing to environmental pollution. Criteria were established to ensure that only non-contaminated rubble less that a standard brick size can be disposed of, with soil having a maximum particle size of 20 mm[1]. Pikitup's disposal management division ensures the productive re-use of building rubble, using it as cover material at landfill sites thus facilitating a circular process.

1 City of Johannesburg. Available at: https://joburg.org.za/media_/Newsroom/Pages/2013%20articles/2011%20&%202012%20%20Articles/Pikitup-aims-to-cut-watse-.aspx.

2. Creating economic value and providing green job opportunities

To capitalize on the economic value of waste and create livelihood opportunities, the development of buy-back centres has reflected an important stage in which waste reclaimers can sort and manage waste materials that hold financial value. The centres are privately owned but supported by Pikitup, and serve as regenerative and non-hazardous sorting facilities in which materials are resold to outside markets for a small profit. Cooperatives across Johannesburg continue to collaborate with household waste reclaimers who are encouraged to sell material to these established facilities. This provides employment and entrepreneurial opportunities to unemployed citizens in the city across both formal and informal communities. To further assist waste collectors, a dedicated forum connects them to the city government, further enhancing engagement regarding their integration into the waste management value chain.

3. Raising awareness on recycling through education

To increase awareness and educate young people on environmental issues and their future implications within Johannesburg, Pikitup developed an Eco-Rangers educational campaign targeting Grade 3 learners. As an engagement platform, four interactive educational characters were created to engage with young children through positive youth development practices. The project was first launched in 2013 across 200 schools as part of a pilot phase, and further extended to an additional 100 schools in 2016, covering both peri-urban and urban areas including towns and townships. The characters were based on and aligned with the national school curriculum: Litter-X (anti-littering message); Lynx (conservation message); Recylo (recycling message); and Sky (carbon footprint message). Working as part of the larger waste minimization campaign Collecting New Possibilities, Eco-Rangers has worked to entrench understanding as to the importance of these behaviours among young children in order to galvanize a new generation of environmentally conscious ambassadors, see Figure 4.2.

Source: Pikitup X. Available at: https://x.com/CleanerJoburg/status/1798310795841085710/photo/2

Figure 4.2 An environmental education session run by Pikitup

Reference experiences

1. Cities can generate inclusive green jobs through recycling economy models

Johannesburg's Separation@Source programme unlocks new green business and employment opportunities serving to accelerate low-carbon local economic development. The initiative highlights the value of recycling for both the local and national economy, supporting SMEs focused on recycling and recovery, which in turn stimulates economic development within the framework of a sustainable closed-loop economy. Offering pathways into formal employment, the programme showcases the potential of integrated waste separation initiatives to provide informal workers with entry into formalized green labour markets. However, it is important to note that where the urban waste sectors attract a large proportion of informal workers, it is especially pertinent that cities provide a robust structure and support system for employees responsible for the implementation of waste recycling programmes.

2. Promote awareness raising on sustainable waste management practices

Active community involvement is fundamental to the successful implementation of the Separation@Source programme. Investment in educational campaigns can help to foster a culture of recycling and sustainable waste management within cities and communities, with a targeted focus on young people in particular, teaching the importance of recycling and how to recycle effectively. To further extend impact, cities can increase recycling rates by encouraging organizations and institutions to implement separation at source in the workplace, however, it is paramount that strategies ensure that recycling is made convenient, minimizing the time required to sort material.

Kunming, China
Youth partnership enhances ecological value of Cuihu Park

Case background

Kunming was the host city to the United Nations Convention on Biological Diversity of COP15 in 2021. As a key city in south-west China, it has long been committed to environmental protection and biodiversity conservation. Cuihu Park, located in the heart of Kunming City, see Figure 4.3, is not only a green oasis for public recreation but also a crucial part of the city's ecosystem. It has witnessed the city's historical changes and plays a vital role in enhancing urban ecological value.

Source: Kunming Dianchi National Tourism Resort. Available at: https://dianchi.km.gov.cn/c/2024-04-29/6844779.shtml

Figure 4.3 Aerial view of Cuihu Park, Kunming

The park spans approximately 21 hectares with 15 hectares of water bodies, and features a historic garden landscape centred around the water. Known for its rich vegetation and beautiful scenery, the park is a significant tourist attraction and an important urban wetland. It plays a key role in regulating the urban climate – purifying the air and protecting biodiversity. However, as urbanization has accelerated and the population has increased, the park has faced severe ecological challenges, particularly from the 1980s to the early 21st century.

Cuihu Park's ecosystem suffered significant environmental pollution towards the end of the 20th century. During the 1980s, uncontrolled industrial and residential wastewater discharge into Dianchi Lake led to rapid deterioration in its water quality, which in turn affected Cuihu Lake – a bay of Dianchi – causing pronounced water pollution and a notable decline in aquatic biodiversity. Native fish species such as the golden-line barbel which once thrived in the Dianchi ecosystem, saw their numbers drastically decrease – and they also disappeared from Cuihu at one point. Additionally, the park faced immense ecological pressure due to rapid economic growth and urbanization. Tourism increased significantly with visitors exceeding 10,000 and peaking at 20,000 daily. This surge in tourism not only strained the environment but also led to vegetation damage and worsening sanitation, hampering the park's ecological recovery.

Since the 2010s, Cuihu Park has undertaken various restoration efforts focused on rehabilitating damaged ecosystems and protecting native species. Through measures such as removing invasive species, restoring water purification capabilities, and reintroducing native plants and fish species, the park's biodiversity has seen significant improvement. Between 2020 and 2024, the number of bird species in the park has increased from 25 to 94 and included 4 nationally protected species, marking Cuihu as an important habitat for birds and a model for urban biodiversity conservation, see Figure 4.4.

Source: People's Daily Online. Available at: http://yn.people.com.cn/n2/2022/1113/c372456-40192428.html

Figure 4.4 Cuihu Park where people and birds now live in harmony

Cuihu Park's approach to sustainable development includes the innovative "Youth Partnership" model. Led by the Kunming Institute of Zoology of the Chinese Academy of Sciences (CAS), this model involves collaboration among multiple research institutions and universities in biodiversity monitoring and ecological restoration. This cross-disciplinary and cross-sectoral cooperation has not only improved ecological protection in the park but also offers valuable insights for ecological civilization initiatives in other cities. The ecological restoration of Cuihu Park has not only improved environmental quality but also contributed to economic development through the realization of ecological product value. The water quality improvement projects and biodiversity restoration within the park have created significant ecological benefits for Kunming. For example, Cuihu Lake's water quality improvement project reduced the water purification cycle from 30 days to 5, significantly enhancing the water quality and landscape aesthetics. These efforts have increased the park's appeal and facilitated the commercialization of ecological products, effectively transforming ecological value into economic value.

The ecological restoration and biodiversity conservation efforts in Cuihu Park have greatly enhanced its appeal as a tourist destination. With the improvement of the environment, the park has attracted a large number of visitors, particularly for its birdwatching and flower-viewing eco-tourism activities, with over 2 million visitors recorded in 2022. The park has now become a benchmark for cultural and tourism integration in Kunming. It has not only boosted tourism revenue but also driven economic development in the surrounding areas. By organizing various cultural activities that blend art and nature, Cuihu Park has successfully created unique cultural brands such as Blooming Seasons at Cuihu which has attracted numerous visitors and spurred the growth of related cultural and creative products and services, forming a well-established culture and tourism industry chain. As its cultural and tourism integration has deepened, Cuihu Park has become an important feature in Kunming, significantly enhancing the region's economic vitality.

Implementation process

1. The Youth Partnership model integrates diverse resources

Cuihu Park's ecological restoration project employs the innovative Youth Partnership model. Led by the Kunming Institute of Zoology (KIZ), this partnership involves multiple research institutions and universities both within and outside Yunnan Province. In 2020, Cuihu Park signed a biodiversity conservation cooperation agreement with KIZ which spearheaded the initiative by providing strategic direction and establishing collaborative networks. By assembling a cross-regional, cross-disciplinary and cross-sectoral team, the partnership continuously explores the best approaches for ecological restoration. The core of this mechanism is to leverage the enthusiasm, dynamism and broad perspectives of young scientists. By bringing together diverse resources, particularly the efforts of researchers and universities, it seeks to collaboratively advance the ecological restoration of Cuihu Park. Under the partnership plan, more research teams and schools have joined the biodiversity monitoring efforts at Cuihu Lake to support and enhance the park's unique landscape features.

Through collaboration with partners from different research fields in Yunnan Province, across China and even globally, the Youth Partnership model has created a diverse research team that utilizes cutting-edge technologies such as AI monitoring systems and environmental DNA (eDNA) for the comprehensive monitoring and management of Cuihu Lake's ecosystem. By using eDNA technology, the research team can quickly identify species in the water and respond promptly to potential ecological threats. This mechanism not only enhances the precision and effectiveness of the restoration project, but also provides a platform for young researchers, allowing them to integrate theory with practice and foster innovative research.

Youth partners are involved in every aspect of the project from design and data collection to the dissemination of results. They have installed cameras throughout Cuihu Lake to track bird activity in real-

time and use data analysis to optimize habitat management. This deep involvement not only improves scientific rigour but also provides young researchers with invaluable experience. The monitoring data shows that since the implementation of the Youth Partnership model, the number of bird species in Cuihu Park has increased, with the population of the common moorhen, by way of example, rising from 25 to 167, demonstrating significant success in bird conservation and ecological restoration.

2. Cultural and tourism integration promotes a "win-win" situation for ecological restoration and economic benefits

Through the Youth Partnership model, the ecological restoration project at Cuihu Park has not only improved environmental quality but also shown significant success in economic development. By effectively managing biodiversity in Cuihu Lake, several native fish species such as the Dianchi golden-line barbel and Ottelia acuminata have been successfully restored. The recovery of these species has not only enhanced the ecological functions of the park but also helped to create an attractive ecological tourism brand for Kunming. Additionally, the improvement of the water quality in the park is a great achievement. With the implementation of reclaimed water replenishment and water quality improvement projects, the water purification cycle at Cuihu Lake has been reduced from 30 days to 5, greatly enhancing the water's transparency and ecological environment. These measures have enhanced Cuihu Lake's ecological appeal, attracting more visitors and thus boosting tourism revenue, see Figure 4.5.

Beyond collaboration in scientific research, support from the government has further enriched the Youth Partnership model and expanded its impact, deepening the integration of culture and tourism at Cuihu Park. With strong support from the municipal and district governments, Cuihu Park has successfully combined natural ecology with cultural arts by organizing and planning a series of events such as the Jacaranda Cultural and Art Festival and Seagull Cultural Festival, creating multiple cultural tourism brands. These activities have not only attracted a large number of visitors but also promoted the development of cultural and creative products and services, forming a complete

Source: Official website of Kunming City. Available at: https://yllhj.km.gov.cn/c/2023-11-13/4793634.shtml

Figure 4.5 Scenic trail in Cuihu Park

industrial chain. Data shows that in 2022, Cuihu Park received over 2 million visitors, especially during the birdwatching season when visitor numbers saw a significant increase, directly driving the development of surrounding businesses and service industries.

Throughout this process, youth partners have actively participated in the planning and implementation of activities, using modern technology and creative methods to transform Cuihu Lake's ecological resources into cultural and tourism products. For example, during the Jacaranda Cultural and Art Festival, the youth team utilized digital technology to visualize Cuihu Lake's ecological environment and historical cultural resources. This not only enhanced the visitors' experience but also increased participation and interactivity at the event. These events have brought considerable economic benefits to Cuihu Park while also enhancing Kunming's cultural influence.

3. Establishing a science education base to enhance spillover effects

Driven by the Youth Partnership model, Cuihu Park has also strengthened its role as a science education base, further boosting its social influence. With joint support from teams at KIZ, the Institute of Semiconductors, CAS and the Yunnan Zoological Society, the park has established an ecological civilization exhibition hall and conducted various science education activities which have not only raised public awareness of biodiversity conservation but also inspired the younger generation's interest in ecological protection.

Cuihu Park has established an exhibition hall for science education in Kunming providing information on biodiversity conservation, ecological restoration technologies and endemic species, see Figure 4.6. It has attracted many visitors – both locals and tourists – and is becoming an important venue for science education activities. In 2022, the Cuihu Ecological Civilization Exhibition Hall was officially recognized as a science education base by Wuhua District and Kunming City, further solidifying its status as science platform. Through diverse science education and research activities, public participation and interactive learning have been enhanced. For example, the park has organized a series of public science projects including eDNA sampling, biodiversity monitoring and invasive species control, allowing participants to engage directly in ecological monitoring activities.

The park has expanded the reach and impact of its science education efforts through multimedia promotion and digital science education methods,

Source: Li Weiwei (Kunming Institute of Zoology, CAS), core member of the Youth Partnership team

Figure 4.6 Cuihu Ecological Civilization Exhibition Hall

such as collaborating with the Yunnan Media Group to produce and broadcast the supporting documentary Song of Life for COP15, and displaying key species within the park through a combination of online and offline methods. Additionally, the park has installed several science education guide signs allowing visitors to scan QR codes to watch related videos and learn about Cuihu Lake's biodiversity and ecological restoration interventions. These measures have effectively increased public understanding and participation in ecological protection activities, see Figure 4.7.

Source: Li Weiwei (Kunming Institute of Zoology, CAS), core member of the Youth Partnership team

Figure 4.7 Primary and secondary school students participating in science education activities in Cuihu Park

Reference experiences

1. Enhance economic benefits through the innovative vitality of the Youth Partnership model

Cuihu Park's Youth Partnership model has integrated scientific research resources and practical platforms, and promoted the organic combination of ecological restoration and economic development. The Youth Partnership team not only introduced advanced technologies in ecological restoration but also significantly enhanced the park's attractiveness and economic benefits by planning and implementing a series of ecology-related cultural and tourism activities.

By improving the water quality, introducing native species and enhancing the ecological environment, Cuihu Park has attracted many visitors, particularly excelling in birdwatching and ecological tourism. With the increase in bird diversity within the park, birdwatching has become a key attraction, directly driving the development of the surrounding food, accommodation and retail businesses. This model demonstrates that other cities globally can draw upon

Cuihu Park's approach when implementing ecological restoration projects. They can leverage the innovations of young scientific research teams to develop tourism products linked to ecological resources and thereby enhance economic benefits.

2. Leverage the synergy of ecological restoration and cultural tourism integration

Cuihu Park's ecological restoration focuses not only on environmental protection but also on generating considerable economic returns through deep integration with cultural tourism. By hosting activities such as the Jacaranda Cultural and Art Festival and the Seagull Cultural Festival, the park has successfully combined natural landscapes with cultural experiences to create cultural tourism brands including Blooming Seasons at Cuihu. These activities have not only improved visitors' experiences but also boosted the sales of cultural and creative products, and the development of the local economy.

This model of combining ecological protection with cultural tourism is of significant value for cities worldwide. While promoting ecological protection, many cities can consider incorporating local cultural elements and developing tourism projects related to ecological resources. This integration of culture and tourism not only enhances the economic returns of ecological projects but also strengthens the cultural influence and visibility of cities.

3. Pursue the mutual transformation of science education and economic value

Cuihu Park's success in science education also offers a new pathway for enhancing economic benefits. By establishing the Ecological Civilization Exhibition Hall and hosting diverse science education activities, Cuihu Park has attracted a large number of visitors and student groups. These activities have not only promoted public understanding and participation in ecological protection, but also provided a steady flow of revenue for the park.

The park has also expanded the influence of science education through modern technologies such as AI smart monitoring systems and digital science education displays. These measures have enticed more visitors to engage in science education activities, driving the growth of the park's economic benefits. Other cities globally can learn from Cuihu Park's experience by strengthening the integration of science education and ecological tourism, creating new economic growth points, and achieving a win-win situation for ecological protection and economic development.

Rio de Janeiro, Brazil
Coletivo Nossa Horta creates urban green spaces

Case background

As one of the world's emerging economies, Brazil has undergone significant urbanization over the past few decades. However, this urban expansion has brought numerous challenges, especially in terms of reduced green spaces, community disconnection and widening income inequality. The economic crisis exacerbated by the COVID-19 pandemic left more than half (58.7 percent) of Brazil's population facing some level of food insecurity in 2022. Over 33.1 million Brazilians were dealing with hunger, and the area of favelas has doubled over the past decade[1]. Rio de Janeiro, one of Brazil's largest cities, has been deeply affected by these issues.

Against this backdrop, many residents of Rio de Janeiro, particularly those living in favelas, began seeking new ways to improve their quality of life. Despite the scarcity of urban green spaces, community gardens have been recognized as an effective means to address food shortages, promote social interaction and raise environmental awareness. It was within this context that Brazil's Coletivo Nossa Horta (Our Garden) project came into being, aiming not only to produce healthy food but also to foster a sense of environmental responsibility through community

1 World Economic Forum. Agroecology and climate change in Favelas. Available at: https://www.weforum.org/projects/agroecology-and-climate-change-in-favelas/.

engagement and education.

The Coletivo Nossa Horta project is a grassroots youth initiative that promotes food security, community cohesion and environmental sustainability through community gardens. It has played a critical role in improving the living conditions of many low-income communities in various Brazilian cities, particularly in Rio de Janeiro, amid increasing urbanization and economic inequality, especially in the aftermath of the COVID-19 pandemic.

Launched in 2019 in several low-income communities within the city, the project was initiated by youth volunteers and community members, and is operated and funded by the municipal government. Each garden is managed by a group of local residents who receive a small stipend for their work. The project has three main goals: (1) to improve food security by establishing urban gardens within communities to produce healthy, pesticide-free food, directly providing basic sustenance to local residents and helping them to address food insecurity. (2) to enhance community cohesion by using urban gardens as platforms for social interaction and encouraging residents to collectively participate in the construction and management of the gardens, thereby strengthening social bonds within the community. (3) to promote environmental sustainability by emphasizing the use of local resources and traditional agricultural techniques thereby fostering environmental awareness and climate education, and reducing the negative environmental impacts of urban areas. The core of this project lies in its community-driven model which combines urban agriculture with social participation, with each community garden being developed through the active involvement of local residents, see Figure 4.8.

Source: World Economic Forum. Coletivo Nossa Horta: Nossa Horta Available at: https://uplink.weforum.org/uplink/s/uplink-contribution/a012o00001pTvqGAAS/nossa-horta

Figure 4.8 Participants of the Coletivo Nossa Horta project

By the end of 2022, the project had successfully established five major community gardens across various neighbourhoods in Rio de Janeiro, providing fresh, healthy produce to over 800 families each month. The project has played an important role in Rio de Janeiro where many families lost their primary source of income due to the COVID-19 pandemic. Through the community gardens, families have not only secured basic food supplies but also an additional revenue stream through the sale of excess produce. For many participants, working in the gardens has also improved their mental health and quality of life through contact with nature and community interaction.

The Coletivo Nossa Horta project demonstrates how the power of communities can address the challenges posed by urbanization. Through the creation and management of community gardens, this project has not only improved living standards for many residents but also provided an innovative solution to climate change and environmental sustainability. Following the project's success, the Rio de Janeiro municipal government is encouraging other communities to replicate and promote the experience. Over the next few years, the community gardens are expected to cover a total area equivalent to 15 football fields, providing food and employment for 50,000 families across 5 favelas. As the project continues to expand, it is poised to offer valuable insights into addressing urban food security issues and promoting sustainable community development both in Brazil and globally.

Implementation process

1. A sustainable economic model of "half for personal use, half for sale"

According to the 2022 report by the Brazilian Research Network on Food and Nutrition Sovereignty and Security (Rede Penssan), "more than half of the country (125.2 million people) is experiencing some form of food insecurity", an increase of 7.2 percent compared with the 2020 report. To ensure the long-term viability of its project, Coletivo Nossa Horta has developed several income-generating initiatives including selling seedlings produced in the project's greenhouse and selling surplus produce at local markets. In 2022, there were sufficient seedlings to establish new gardens in other parts of the city, with the revenue generated reinvested into the project.

Using the urban garden in Manguinhos, as shown in Figure 4.9 as an example, it spans an area equivalent to 4 football fields and produces 2.5 tons of cassava, carrots, onions, cabbages and other vegetables monthly. The economic impact of the project extends beyond the direct income generated from the sale of the produce and seedlings. By providing residents with the skills and resources to grow their own food, the garden project has reduced their dependence on external food sources, helping them to achieve greater food security. This, in turn, has freed up household income for other basic needs, further enhancing the economic resilience of the community. Today, half of the produce grown in Rio de Janeiro's community gardens is consumed by favela residents, while the other half is sold at market prices with the gardeners sharing the profits. The garden project has become "an important lifeline for many struggling to survive", offering residents the opportunity to work in a healthy and beneficial environment.

Scalability is another focus of the project. The success of the initial gardens has prompted plans for expansion, with the goal of establishing similar projects in Rio de Janeiro and beyond. The Coletivo Nossa Horta project has documented the methods and experiences accumulated during its development and shared them with other communities in Brazil and internationally, allowing the model to be replicated in different contexts. The scalability of the project has also earned it the support of local governments and international organizations, providing additional resources and backing for its expansion.

2. Keyhole gardens enhance the sustainability of urban gardens

Sustainability is another core technical approach of the Coletivo Nossa Horta project. It emphasizes the use of organic farming techniques that are both environmentally friendly and suitable for urban settings, including practices such as composting, natural pest control and growing a diverse range of crops to enhance soil fertility and biodiversity. One innovative practice introduced by the project is the use of "keyhole gardens" which are circular, raised gardens

Source: Positive.News. Available at: https://www.positive.news/society/the-rio-de-janeiro-garden-that-saves-lives/

Figure 4.9 Urban community garden in Manguinhos

designed to maximize water use efficiency and soil health. Each keyhole garden can support up to 20 families, providing fresh organic produce year-round. In 2022 alone, the keyhole gardens established by the project produced over one ton of food which was distributed to participating families and sold at local markets.

Additionally, the project promotes the use of native seeds, traditional varieties that have not been hybridized or genetically modified and are particularly well-suited to Rio de Janeiro's local climate conditions. An ideal choice for urban agriculture in the favelas, the project has successfully cultivated crops such as corn, okra, eggplant and kale, which not only adapt well to the local environment but also meet the nutritional needs of the community.

3. Regular community-engaged discussion sessions

The Coletivo Nossa Horta project places a strong emphasis on community involvement which is key to ensuring its success and sustainability. Since the project's launch in 2019, it has organized community meetings to engage residents in the discussion and planning of urban gardens. These meetings have been crucial for gaining the community's trust and active participation, especially in areas such as Manguinhos in northern Rio de Janeiro where similar initiatives previously struggled due to a lack of local commitment.

By 2022, the project had expanded to five major urban gardens, including the one in Rio de Janeiro, with more than 800 families directly participating in their management. Following these successful developments, the project plans to gradually implement

its initiatives across all 763 favelas in Rio de Janeiro, home to 22 percent of the city's population. Each garden is collectively managed by residents who are responsible for planting, maintaining and harvesting the crops, see Figure 4.10. Resident participation in every step of the project helps to foster a strong sense of belonging and pride, encouraging a spirit of cooperation that extends beyond the gardens to the wider community. The project's monthly community gatherings are both social events and regular meetings for discussing project progress and planning future direction, crucial for maintaining the project's healthy development. These gatherings not only facilitate the sharing of ideas and experience, but also provide a platform for collectively addressing the challenges faced in the gardens such as water shortages and pest control.

Source: World Economic Forum. Agroecology and climate change in Favelas. Available at: https://www.weforum.org/projects/agroecology-and-climate-change-in-favelas/

Figure 4.10 Active participation of the Global Shapers Rio de Janeiro hub

4. Training workshops boost resident skill development

Education and skills development are vital components of the Coletivo Nossa Horta project. Since its inception, over 100 training workshops have been held covering a wide range of topics from basic gardening techniques to advanced agricultural practices. These workshops are tailored to meet the needs of the community, ensuring that people of all ages and educational backgrounds can participate.

The educational content of the project extends beyond technical skills and includes courses on food sovereignty and climate change. By educating participants on the broader impact of their gardening activities, the project empowers them to make informed decisions about food sources and environmental impact. This comprehensive approach to education not only enhances participants' gardening skills but also increases their awareness of global environmental issues. Intergenerational knowledge transfer is another key initiative of the project. Older residents who often possess valuable knowledge of traditional agricultural practices share their insights with younger participants during the workshops, and this exchange of knowledge helps to preserve cultural heritage while introducing innovative techniques to improve garden efficiency and sustainability.

Reference experiences

1. Achieve "dual sustainability" through key projects

The Coletivo Nossa Horta project successfully integrates environmental and economic sustainability. By adopting organic farming using local seeds and promoting water-saving irrigation techniques, the project effectively reduces its environmental impact while increasing soil fertility and biodiversity. These sustainable agricultural practices not only protect the environment but also ensure the quality and safety of the produce, providing community members with a reliable source of sustenance.

At the same time, the project generates economic benefits through the sale of excess produce and seedlings, with the revenue reinvested into the project, ensuring its economic sustainability. For urban areas facing limited resources and environmental pressures, the project offers a model that effectively demonstrates how to balance economic and environmental needs in an urban environment. From this model, other cities can learn how to protect the environment while promoting economic development through innovative agricultural practices and community economic activities.

2. Enhance local residents' skills through intergenerational knowledge transfer

Education and capacity-building are critical to the success of the Coletivo Nossa Horta project. By organizing numerous workshops and training sessions, the project has improved the agricultural skills and environmental awareness of community members. More importantly, these educational activities are not limited to technical training but also include in-depth discussions on food, climate change and sustainable lifestyles. This holistic education empowers community members to apply the knowledge in daily life, promoting sustainable lifestyles on a broader scale.

For other cities, education and capacity-building are also important levers for driving sustainable community development. By providing training and education tailored to local needs, cities can cultivate a generation of capable and conscious residents who can not only promote sustainable development within their communities, but also spread this knowledge and experience more widely. Additionally, educational activities can facilitate the transfer of knowledge between different generations, helping to combine traditional agricultural knowledge with modern techniques and inject new vitality into urban agriculture.

3. Build a community-driven model with broad local participation

A core feature of the Coletivo Nossa Horta project is its community-driven model which emphasizes the active participation of community members from project design to implementation. This involvement not only enhances the sense of belonging and responsibility among community members, but also promotes community cohesion and the accumulation of social capital through shared labour. In the project, community members are not just beneficiaries but also key participants and decision makers. This participatory approach has effectively enhanced the sustainability of the project.

Other cities around the world, especially those facing similar socioeconomic challenges, can learn from this model how to drive project success through community involvement. Unlike government-led or top-down projects, community-driven projects are better suited to local needs and cultural contexts, and can reduce the risk of project failure. Broad community participation helps to enhance sustainability as community members are more invested and play an active role in the long-term maintenance of the project.

Lagos, Nigeria
Recycling scheme for women and youth empowerment

It is estimated than over 200,000 metric tons of plastic waste from land-based sources in Nigeria are dumped into the Atlantic Ocean annually. In the city of Lagos alone, more than 85 communities with an average of 700 members are contributing around 1,000 kg of plastic waste. Situated on the Atlantic coast, these communities are also highly vulnerable to the impacts of improper waste management such as flooding, and adverse sanitary and health issues. It is projected that over NGN 200 million and 3,000 direct and 9,000 indirect jobs are lost due to environmental degradation and pollution within Lagos State, which is negatively impacting the labour market. Waste recycling, however, provides key economic opportunities while reducing the environmental burden of local communities; an opportunity that is especially pertinent where estimates indicate that scrap metal and plastic recycling account for up to USD 700 million in Lagos each year[1].

Working with coastal communities in Lagos State, the Recycling Scheme for Women and Youth Empowerment (RESWAYE) is an innovative social enterprise aiming to tackle such environmental and climate challenges, promoting sustainable communities by retrieving post-consumer waste from its point of generation into the recycling value chain, advocating sustainable packaging and filtering marine litter. As a finalist of the European Union-UNDP Growth Stage Impact Ventures in Nigeria, the initiative works to establish livelihood opportunities for young people and women by giving them the opportunity to build financial independence through training via a unique business model that transforms waste to wealth. The initiative collects plastics, cartons, caps, glasses and nylon for conversion into sorted clear plastics. Organic waste material is also collected and processed into compost which is used in the RESWAYE community garden and farm to enhance food security, community composting, upcycling and organic waste management, whilst unlocking new jobs and strengthening the local economy, see Figure 4.11.

Source: Urban Innovative Actions. Making sense of change, together. Available at: https://www.uia-initiative.eu/en/news/making-sense-change-together

Figure 4.11 Members of RESWAYE planting trees

1 UNDP. RESWAYE empowers women and youth in coastal communities through recycling service and practices. Available at: https://sdginvestorplatform.undp.org/case-studies/reswaye-empowers-women-and-youth-coastal-communities-through-recycling-services-and.

RESWAYE actively facilitates community engagement in tackling climate issues and provides enterprise opportunities for small-scale recycling partnerships. Where recyclables are used as a currency to trade for hygiene care kits for women and girls, food stuffs, educational materials and small-scale renovation projects, it promotes a clear and more sustainable environment whilst bolstering the financial standing of local communities, providing green career opportunities to young people. As the programme teaches children the importance of recycling, this creates a ripple effect to enhance environmental sustainability. Since its inception in 2019, the initiative has collected over 573,783 kg of waste across 41 Lagos communities in Eti-Osa and Ibeju-Lekki. It has recruited over 4,000 women and youths, empowering over 2,000 via recycling business training and startup kits providing them with a sustainable livelihood[1].

Complementing recycling efforts, RESWAYE actively involves itself with community engagement and support initiatives, and has distributed more than 10,500 food support packages and 5,000 care packs to children, youths and women across multiple communities[2]. Through its contribution to the development of a circular economy in Lagos State, RESWAYE is enhancing awareness of sound environmental practices and sustainable waste management among young people, in turn reducing the environmental impact of local communities.

Jiujiang, China
Construction of a youth-friendly low-carbon park community in Chaisang District[3]

The Ministry of Housing and Urban-Rural Development of China is actively promoting the construction of youth-friendly cities with a focus on optimizing the living environment for young people. This includes addressing the shortfall in public service facilities such as elderly care stations, nurseries, kindergartens and primary schools. The initiative also aims to create public areas for young people, encouraging the sharing of parks and green spaces to provide diverse venues for social interaction, cultural and sports activities, and leisure. The ministry has accumulated a wealth of experience in addressing the urgent concerns of young people and enhancing urban quality.

The Chaisang Park Community is located in Shahe Sub-district, Chaisang District, Jiujiang City, Jiangxi Province. The community currently consists of 2,510 households with 5,612 residents, covering a total area of 32.73 hectares. Situated in the city centre, most of the community's buildings were constructed in the 1990s and many of the supporting services are outdated and no longer meeting residents' needs. Lacking public activity spaces and green areas, the overall living environment is out of harmony with the nearby scenic areas, affecting the city's image and quality. Therefore, upgrading and renovating the community has become an urgent priority. To this end, the community has undertaken the following measures to build a complete community:

(1) Creating a youth-friendly community. In line with the standards and requirements for constructing a complete community, public service facilities have been continuously improved to address the concerns of youth. To meet young people's needs for exercise and recreation, the community has renovated the square, added fitness facilities, and introduced new greenways and a community reading room. To support youth in

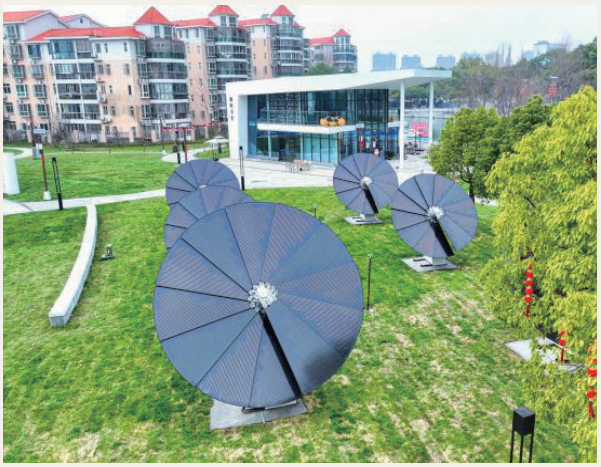
1 Urban Innovative Actions. Making sense of change, together. Available at: https://www.uia-initiative.eu/en/news/making-sense-change-together.

2 RESWAYE. Available at: https://reswaye.org/about/.

3 This case study was recommended by the Ministry of Housing and Urban-Rural Development of China with significant support from the Jiujiang Housing and Urban-Rural Development Bureau. We express our gratitude for their contributions.

caring for their elderly family members, new community stations have been established to provide services such as home-based daytime care and cultural entertainment for seniors. To address the challenges of childcare for young families, childcare facilities have been integrated into the community's comprehensive service centre, offering indoor childcare, children's activity spaces and care services.

(2) Building a green low-carbon park. With energy conservation and carbon reduction as important goals, the community is promoting green development and creating a "near-zero carbon community". Photovoltaic power generation facilities have been installed in Yuanming Park and on residential rooftops, including 6 sets of photovoltaic sun-tracking power units, 30 photovoltaic courtyard lamps and 5 photovoltaic leisure benches, see Figure 4.12. A 1,000 m^2 integrated car park with rooftop photovoltaic panels has also been constructed, combining functions such as photovoltaic corridors, photovoltaic benches and "solar storage and charging", all integrated within the natural landscape. The community's solar power generation operates on a "self-use with surplus electricity fed into the grid" model. According to the relevant statistics, the photovoltaic facilities generate 54,100 kWh of electricity annually, providing green energy to 824 households. Annually, 563 tons of standard coal is saved, reducing carbon emissions by 140.9 tons and ammonia emissions by 37.36 tons.



Source: Jiujiang Housing and Urban-Rural Development Bureau

Figure 4.12 Photovoltaic power generation units in the Chaisang Park Community

(3) Promoting community co-construction and co-governance. Leveraging its service centre, the community has established a digital service platform that provides the hardware and software foundation for creating a safe community. This platform uses technologies such as automatic capture, image recognition, the Internet of Things, AI analysis and automatic push notifications. In conjunction with the community's specific conditions, various resources have been integrated, and home-based services such as housekeeping, and elderly and childcare services have been introduced to meet the needs of community residents. The community has developed a Residents' Convention and regularly organizes stakeholders to address various community challenges so as to further foster a consensus among residents and enhance their sense of identity and belonging. Youth are encouraged to actively participate in community building through volunteer activities such as the Youth Assisting the Elderly People and Children initiative, which aims to strengthen the sense of ownership among young people in community governance.

Policy suggestions

1. Strengthen youth leadership in ecological restoration and the green economy

Governments should encourage young researchers and entrepreneurs to actively participate in ecological restoration and green economy projects through policy incentives and resource support. For example, the case of Kunming's Cuihu Park demonstrates that the Youth Partnership model can effectively promote the scientific accuracy and effectiveness of ecological restoration projects and achieve a win-win situation for both ecology and the economy. Policymakers can establish special funds to support youth teams in

ecological restoration, renewable energy utilization and other projects. Youth innovation platforms should be established to foster cooperation between research institutions, universities and enterprises, thereby jointly advancing the development and application of green technologies. This approach can not only increase the success rate of ecological projects but also provide more employment opportunities for youth, promoting sustainable economic development.

2. Promote youth empowerment and participation at the community level

Communities are key places for addressing climate change and promoting the green economy. Governments should adopt policy measures to encourage broad youth participation at the community level, particularly in sustainable development projects. For instance, the Coletivo Nossa Horta project in Rio de Janeiro illustrates the significant role of youth in community sustainable development. Through the establishment of community gardens, the project has improved food security and strengthened community cohesion. Governments can provide funding, technical training and policy support to incentivize youth to initiate and participate in sustainable development projects within their communities. This will help to improve environmental quality, enhance social cohesion and provide pathways for youth to engage in economic development.

3. Implement green employment programmes to promote the economic independence of youth and women

Green employment is a crucial pathway for achieving a green economic transition. Governments should implement green employment programmes with a particular focus on empowering youth and women. For example, RESWAYE in Lagos demonstrates how the recycling economy can create green jobs. Policymakers can draw upon this experience to promote vocational education and training in green economy sectors, thereby helping youth to acquire skills in recycling, renewable energy and environmental technologies. Governments should collaborate with the private sector to create green employment opportunities and ensure that youth and women have equal access to these jobs. This will help to mitigate climate change while enhancing the inclusivity and equity of the socioeconomic system.

4. Promote low-carbon community construction and encourage youth participation in urban governance

Governments should encourage and support youth participation in low-carbon community construction so as to promote green community transformation. For instance, the low-carbon park community construction case in Jiujiang demonstrates the central role of youth in community governance and the promotion of low-carbon lifestyles. Policymakers can establish pilot projects for low-carbon communities to encourage youth to play active roles in community planning, energy management and public services. Governments should provide policy guidance and financial support to promote the construction of youth-friendly communities, application of renewable energy and development of green infrastructure. This will not only contribute to sustainable community development but also enhance youth participation and responsibility in community governance.

5. Promote circular economy models to drive urban sustainable development

The circular economy is essential for achieving efficient resource utilization and reducing environmental pollution. Governments should strongly promote circular economy models, especially by leveraging the power of youth to drive this transformation. For example, the Separation at Source programme in Johannesburg highlights the critical role of youth in advancing the circular economy. Governments can encourage youth participation in recycling and reuse activities by formulating supportive policies. These measures should include strengthening education and outreach on waste management, providing relevant technical and financial support, and helping young entrepreneurs to establish businesses in the recycling economy. Additionally, a robust resource recycling network and market mechanism should be established to ensure that the circular utilization of resources can form a sustainable economic model. This will help to reduce urban waste emissions and drive cities toward a green economic transition.

Chapter 5

Society: youth leading inclusive green urban societies and communities

Introduction[1]

This chapter focuses on the role of youth in local community climate action and highlights three main issues: (1) socialization of youth, which emphasizes how various forces, such as the government, market and social organizations, empower youth in their climate action efforts through education and training, green jobs, innovation and entrepreneurship, and media campaigns. This process helps to bridge their gaps in knowledge, experience, resources and capacity for action; (2) the social influence of youth, which illustrates how youth act as climate actors and activists within urban communities. The analysis explores how they lead local low-carbon lifestyles by adopting green life practices, technological and social innovations, advocacy and mobilization, and public service; and (3) the climate action and social cohesion which examines how youth-led climate action can promote justice education, care for vulnerable groups, community mutual aid and sustainable social development.

The first case study is set against the backdrop of the renovation of old residential communities in Nanning, Guangxi Province, China. Universities, social organizations, communities and residents jointly initiated the Zero Waste Community action with the support of the municipal government. Through the Seed Fund initiative and college student competitions, optimization solutions for micro-spaces in communities featuring low energy consumption were suggested by youth. In addition, a collaborative team comprising youth volunteers and community residents was engaged in local low-carbon construction activities such as re-purposing idle items and community planting, a move that encourages youth participation, boosts leadership development and enables low-carbon practices amongst communities, rebuilding trust among residents on the benefits of public spaces.

The second case study explores the DARAJA Project, a programme aimed at improving the precaution awareness and response capabilities of residents in urban informal settlements regarding extreme weather. In this project, a connection was established between national meteorological and hydrological services, and community development organizations through a network of stakeholders built on the partnership between enterprises and social organizations, as well as the adoption of a system-wide co-production approach. With multiple publicity means in place, this project has managed to benefit high-risk informal settlements in Nairobi, Kenya and Dar es Salaam, United Republic of Tanzania by enhancing precautions from local residents against extreme weather and encouraging them to engage in actions for strengthened community resilience.

The third case study involves Changbai Neighbourhood 228 in Shanghai, China where the government and businesses collaborate to promote the inclusive renewal of old residential areas. A group of dedicated young professionals actively practices green principles and uses low-carbon technologies to turn communities lacking infrastructure and commercial facilities into vibrant, youth-friendly community centres. The newly-added commercial and public spaces, affordable housing and cultural events in these communities attracts large numbers of young people to settle and work there, encouraging them to contribute personally to sustainable community governance.

The first boxout focuses on the revitalization and adaptive reuse of the Old Tai Po Police Station in Hong Kong, China, a project that integrates historical, architectural and ecological concepts, leading to its reopening as the "Green

1 This chapter was jointly written by the team from the Fudan University, Tongji University and UN-Habitat. The Fudan-Tongji author team includes Yu Hai, Zhong Xiaohua, Yin Keluan, Mao Jianyuan, Sun Xiangming and Bo Yuting. The Nairobi and Dar Es Salaam case study and the Marrakech case study were written by UN-Habitat. The Hong Kong case study was contributed by the Development Bureau of the Government of the Hong Kong Special Administrative Region of the People's Republic of China. Liu Yuelai, Sun Zhe, Jiang Yifan, Zou Huahua and Liu Zhen also contributed to the discussions for this chapter.

Hub" educational base. Thanks to programmes such as green life courses, carbon pioneer training and the Carbon Neutral Challenge, young people in Hong Kong have the opportunity to throw themselves into local climate actions. The second boxout covers the Pikala Bicycle programme in Marrakech, Morocco, a social innovation project initiated by a Dutch social entrepreneur that promotes environment-friendly transportation and sustainable travel options by refurbishing abandoned bicycles donated by the Kingdom of the Netherlands. The programme trains and employs local youth, providing them with green job opportunities as tour guides, delivery personnel, social project managers and bicycle repair specialists, and at the same time gives local women and children tuition on how to ride a bike. Supported by various stakeholders, the project is expanding to other Moroccan cities, successfully implanting the idea of environment protection and healthy lifestyles into the minds of the locals, while improving the resilience of local youth, women and children both economically and socially.

All the cases in this chapter illustrate youth climate action at the community level, encompassing the organic renewal of neighbourhoods and buildings, informal housing governance, youth vocational training, circular economy and transnational green organizations. Youth, whether within NGO or community projects, or in the facilitation of green technologies and sustainable development via their professional know-how, play an indispensable role in these practices. Their involvement in organizing and participating in various environmental activities fosters collaboration and mutual assistance among community members, thereby strengthening community cohesion and overall resilience.

Case studies

Nanning, China
Youth-led community low-carbon construction action supported by community deliberation[1]

Case background

Rapid urbanization in China is improving living conditions through extensive infrastructure development, however, cities are left with large piles of construction waste and the increase of carbon emissions which is putting a strain on the urban climate and environment. Given these circumstances, it has been a major challenge to strike a balance between urban growth and realization of the SDGs. Up to 220,000 residential communities were built by the end of 2000. These communities are inhabited by over 39 million households of 100 million residents and the buildings are already in their depreciation stage. To exacerbate matters, most of these communities are faced with an alarming lack of infrastructure with no access to an owners' committee or property management services, resulting in poor maintenance. In order to address this dire situation, local government is required to put the renovation of old communities high on their urban renewal and development agenda. A particular challenge in the renovation of old communities is how to mobilize multiple stakeholders for joint efforts to effect sustainable environmental and climate-friendly upgrades.

In response, a community-supported, youth-led Community Low-Carbon Construction Action plan was proposed through collaboration with the Nanning Municipal Housing and Urban-Rural Development Bureau of the Guangxi Zhuang Autonomous Region, which primarily focuses on the renovation of community roads, pipelines and roofs. An Old Friends Deliberation Council was set up, a move that facilitates communication between youth and government bodies as well as community residents to advance low-carbon construction actions such as Community Low-Carbon

1 The authors are: Yin Keluan from Shanghai Clover Nature School Teenager Nature Experience Service Center, Wei Ge and Qin Lanqiu from Nanning Municipal Housing and Urban-Rural Development Bureau. Special thanks to Wang Jing, Huang Fuzhang, Kan Tong, He Xinyun, Mao Jianyuan, Liu Yuelai, and others for their collective support.

Construction. Representatives from the council who are involved in the renovation process from start to end can continuously communicate with all relevant parties involved, including those responsible for construction, design and contracting, to clearly define responsibilities, establishing an effective communication channel as a result. By empowering and authorizing the Old Friends Deliberation Council, the local government approach to project management has been replaced with a governance structure in which the local government takes the lead with collaboration from communities and engagement from community residents, fostering positive interactions among all parties involved.

From 2021 to 2023, through national community garden design competitions, community participation actions and seminars, over 800 university students and young designers formed volunteer teams with the intention of putting the Community Low-Carbon Construction concept into practice, partnering with over 1,600 local residents to set up renovation groups for collective efforts. Approximately 500 workshops were held, with over 100 communities in Nanning simultaneously carrying out low-carbon construction actions such as idle item renovation, community planting, garden waste processing and on-site wet waste disposal. With profound significance in youth-led climate actions, these programmes are meant to encourage youth participation and elevate youth leadership while driving low-carbon practices at the community level that stimulate innovation and set a benchmark for similar endeavours.

Implementation process

1. Forming a joint working team to build a structured participation framework

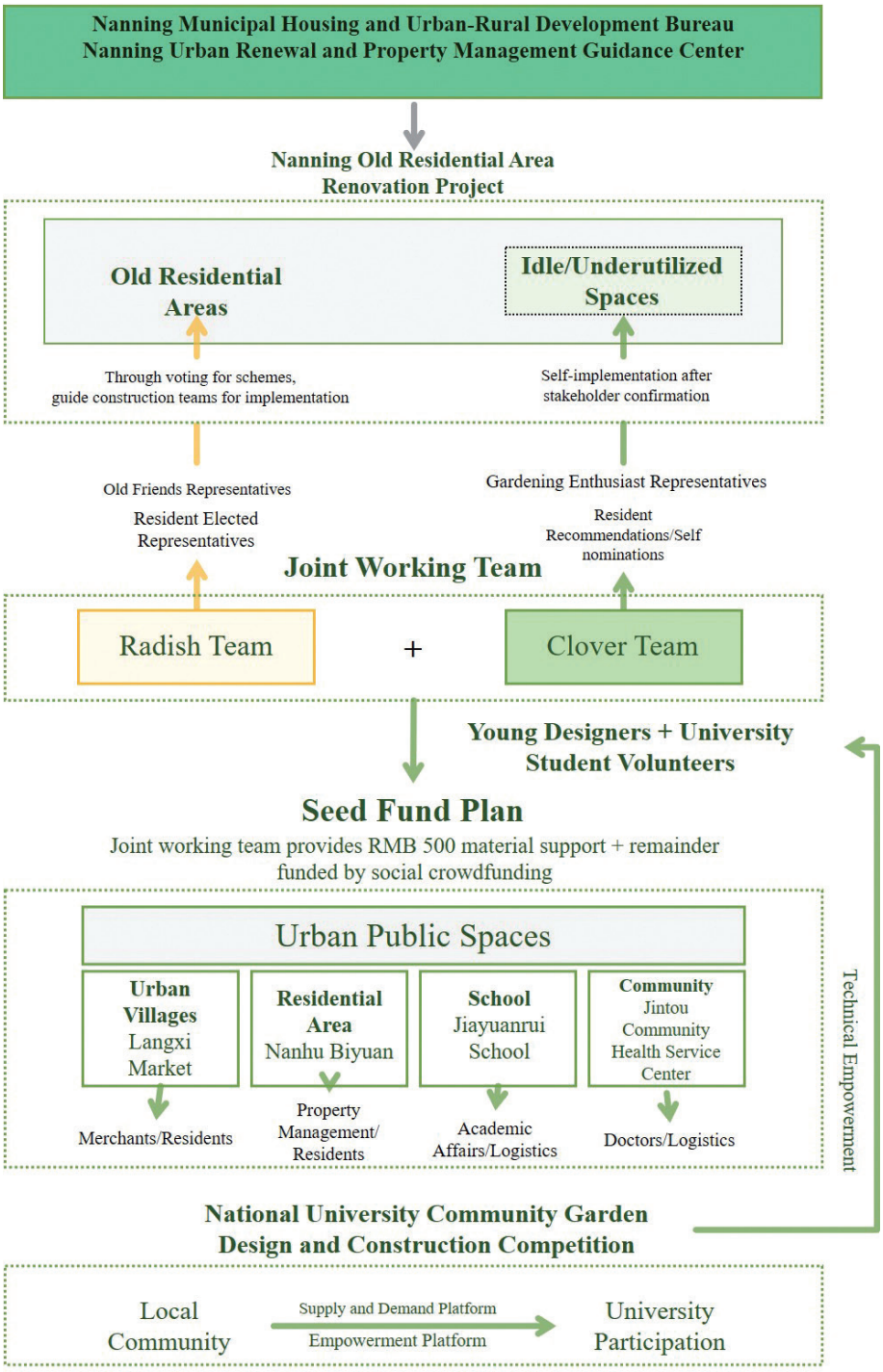
The joint working team consists of Luobo Consulting (Luobo Team) – a campaigner for *Robert's Rules of Order*[1], and the Clover Nature School (Clover Team)[2], which focuses on community garden research and practice. Both teams share a consensus and common vision in public participation and sustainable development, and serve the old community renovation project launched by the Nanning Municipal Housing and Urban-Rural Development Bureaus.

The Luobo Team gained communities' trust via a survey and election of representatives for the Old Friends Deliberation Council; while the Clover Team, via community lectures, managed to mobilize over 500 university students and faculty members, and nearly 800 young people to throw themselves into the Community Low-Carbon Construction action programme. As a means of deeper engagement in community affairs, the action programme allows participants to put their professional know-how into actual use, while contributing to community development. Another group of participants included experienced designers and freelancers who researched residents' accommodation needs, hoping to embed awareness of low-carbon and environmental protection practices into the project implementation to create positive impacts.

The joint working team integrated resources from various parties with renovation funds from local governments and social capital allocated for the transformation of community spaces. In addition, independent fundraising was carried out in locations with inadequate government funding by attracting sponsors from various backgrounds. The efforts made by young professionals from design and renovation sectors to build trust with community residents were backed up by targeted training and instructions offered by the joint working team throughout the process, see Figure 5.1.

1 *Robert's Rules of Order* is a widely used guidebook on parliamentary procedure, outlining the rules and procedures for conducting meetings, debates and decision-making processes in organizations, clubs or assemblies. Luobo Consulting Co., Ltd. is a consulting organization with a focus on delivering strategic advice and operational support to a wide range of clients, such as businesses, NGOs and other industries.

2 Clover Nature School is a NGO dedicated to the environmental development of urban and rural communities, public participation and education. It advocates a sustainable lifestyle through the practices of community gardens and other public services. This case study is a continuation of their previous community garden practice in Shanghai as highlighted in the *Shanghai Manual*.



Source: Provided by Clover Nature School

Figure 5.1 Organizational framework diagram

2. Setting a benchmark for efforts in community development: Ronghe Xincheng

Ronghe Xincheng in Jiangnan District, Nanning, a typical example of community development, was one of the first commercial housing areas consisting of 37 buildings accommodating 1,287 households. Through the efforts of 21 representatives from the Old Friends Deliberation Council and 436 volunteers, residents of

Ronghe Xincheng all participate in the separation of waste at source and conduct supervision at the bins, leading to a consensus and the proactive practice of waste sorting. The kitchen waste processing centre takes sorted kitchen waste and garden waste to the terminal of the centre where the waste, after being crushed, is mixed with several other ingredients, fermented for a certain period and then transformed into organic fertilizer which can be used for gardening work or soil improvement in the community, or given to visitors. Thanks to the joint efforts of the shared community kitchen waste processing centre and a space renovation network, low-carbon actions now thrive in this community. To date, Ronghe Xincheng has processed 308.82 tons of garden waste and 30.96 tons of kitchen waste, producing 157.5 tons of fertilizer.

The waste treatment technology is supported by professional partners resulting in a carbon trading purchase and sales agreement for the project. Ronghe Xincheng's kitchen waste processing centre was provided by The Lyondell Basell (LYB) Science & Technology Group and uses an "organic waste multi-layer static high-temperature aerobic fermentation" system. LYB's Pollution Reduction and Carbon Emission Reduction — Biomass Carbon Resource Recycling Project achieved a carbon reduction of 1.417 million tons from 1 June 2020 to 31 December 2022 as certified by Verra. The carbon offsets from the project were purchased by Demeter Investment Ltd in the United Kingdom of Great Britain and Northern Ireland, thus turning the carbon offsets from the environmental management and fertilizer resource production of organic waste in urban and rural areas into specific economic benefits. New opportunities have also been promoted for future carbon reduction projects at kitchen waste processing centres to participate in international and domestic carbon trading.

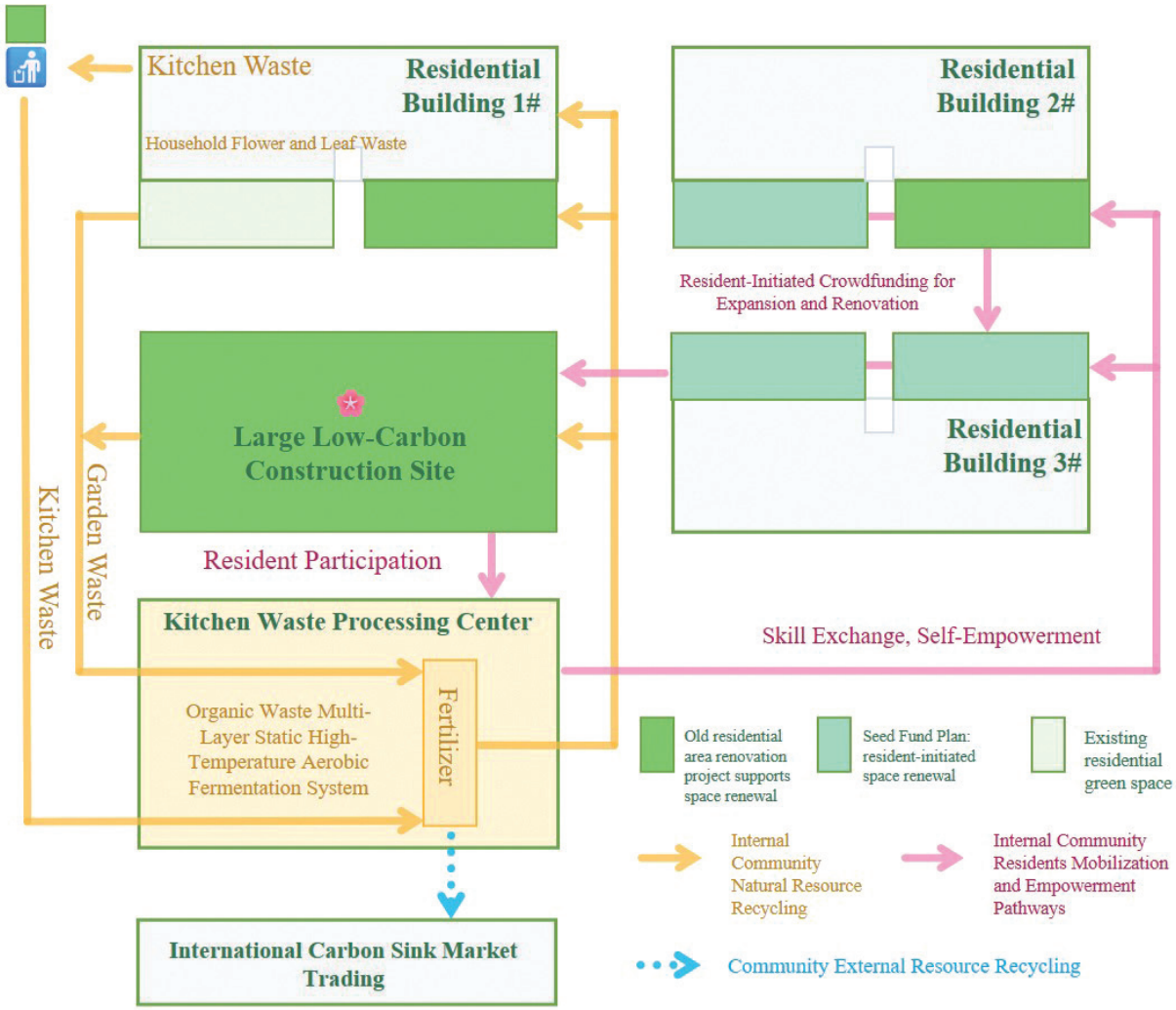
In addition to the shared community kitchen waste processing centre, Ronghe Xincheng also has a space renovation network of 70 small, medium and large sites. The small sites are 5 ~ 10 m^2 near residents' homes, typically managed by 1 ~ 2 residents; the medium sites are 10 ~ 50 m^2 in sub-community green spaces, managed by teams of residents from the nearby buildings; and the large sites are 500 m^2 in the central green space of the community, jointly managed by the property management company and residents.

The general public was skeptical of participation in the space renovation, initially. However, after the successful renovation of the first sub-community green space, the benefits of the proper utilization of public spaces spread across the community, attracting wider engagement. As residents' enthusiasm grew, the joint working team started to focus on the provision of further opportunities for participation and recruitment of more core members. Residents, assisted by representatives from the council, spontaneously raised funds and purchased materials to renovate other spaces. Some residents put in complaints about various proposed undertakings, however, the representatives listened and adjusted the plan, organized a joint application and ultimately gained support from different stakeholders at the renovation sites. Ronghe Xincheng has successfully moved to a stage in which low-carbon actions are now practiced in public spaces.

3. Catagorize low-carbon action plans for multiple scenarios

Given the fact that public spaces involve numerous stakeholders, the joint working team categorizes idle spaces and provides tailored solutions, designing low-energy modular units adaptable to various scenarios. This creates a repository of scalable experience and case studies that can be used to offer better support to local community partners in their efforts to act on 5 m^2 as the basic unit. Challenges in every detail and of moderate significance in renovation projects of old communities can today be addressed with laser-like precision.

Through consultation with community members, the joint working team worked out the problems in community spaces looking at landscape design, space optimization, functional integration and facility improvement, see Figure 5.2. These included (1) environmental beautification and preservation, such as moss at hallway entrances and littering; (2) space planning and utilization, for example insufficient non-motor vehicle parking spaces and community resting spaces; (3) safety hazards and governance which involves garbage collection at septic tanks and fallen leaves from tall trees; (4) community function and



Source: Provided by Clover Nature School

Figure 5.2 Low-carbon space solutions

vitality enhancement such as attracting customers to street-facing shops and managing disorganized sub-community green spaces. Residents used waste materials in all renovations, for example using tires for seating or planting, converting abandoned pools into art installations or planting beds, using bamboo for backdrops and lighting, and repurposing old clothes racks into children's play facilities. Additionally, some residents donated chairs and plants for community use.

During the action process, growth of youth and the community was nurtured. For example, in the Jubaoyuan community participation action, Mr Wei Yangtao – a youth returned from overseas – organized a series of natural sustainable design and construction workshops with his family, sparking concern and then action among community residents regarding climate change. This has opened up the potential for youth to utilize community actions for entrepreneurship – important catalysts for triggering action.

4. Encouraging bottom-up public participation: Seed Fund initiative and community garden design competitions

Public funding only covers renovation efforts in a portion of old communities, but about a year into the youth community action plan, as its influence grew and with increasing media coverage, more residents expressed interest in being involved. Using

this momentum, the joint working team, supported by the public sector, launched a Seed Fund initiative which provides a broad pathway for participation and encourages residents to transform nearby unused spaces using minimal materials and common tools.

The sites supported by the Seed Fund initiative have attracted participation from young students and teachers across the country who were involved in the National Community Garden Design and Construction Competition and Community Participation Action. Jointly initiated by the College of Architecture and Urban Planning of Tongji University, *Chinese Landscape Architecture* magazine and 34 landscape architecture schools across China, the competition centred on Zero-Waste Gardens and mobilized national resources to explore low-carbon approaches to spatial renewal and governance with minimal public expenditure. Sharing this same vision with the Seed Fund initiative, the competition works in tandem with the latter to pool resources from universities across the country. This has resulted in a wide-reaching network of nationwide youth-led social activities featuring co-construction, co-governance and shared benefits, driving communities to independently and spontaneously improve urban spaces.

The first batch of Seed Fund recipients included 200 spaces, 150 of which have been supported to date. The types of public spaces involved in the initiative have gradually diversified, and the joint working team has developed co-creation modules tailored to different needs. For example: (1) peri urban areas such as Langxi Night Market and Macun, where the main participants are merchants and the primary goals are to enhance storefront visibility and beautify the surrounding environment; (2) kindergartens near residential areas, aiming to create a public space that imparts education through activities and exposure to nature; (3) community health service stations intending to create a physical and mental healing environment for visitors, see Figure 5.3.

Rest area under the eaves of the Songbiandian Community

Beverage store at Langxi Night Market

Ronghe Xincheng art gallery

Ronghe Xincheng children's park

Xinyi Garden in Nanlü Community

Convenience store in Nanlü Community

Source: Provided by Clover Nature School

Figure 5.3 Green micro-landscapes after renovation

Reference experiences

1. Establish low-carbon renewal plans and implement sustainable local construction actions

In the renovation of older residential communities, residents should be allowed to develop low-cost, low-energy, locally-tailored renewal plans based on their particular living needs and resources. Residents can choose commonly available and easily accessible materials for the renovations, such as reclaimed wood and recycled plastics, to reduce material costs and minimize the environmental impact. Residents can be trained and given access to workshops to familiarize themselves with or master renovation techniques and processes, thereby enhancing their skills in association with spatial renewal, construction, maintenance and more. Additionally, since government funding for spatial construction is generally one-off, the long-term maintenance of these spaces should be managed by the community itself. Another option is to establish a community maintenance fund which collects small contributions through charitable investments and community crowdfunding to support daily minor maintenance and repairs, thus preventing public spaces from falling into disrepair due to a lack of funding.

2. Build a youth-participation deliberation network and practice inclusive multi-party collaboration support mechanisms

A youth-participation deliberation network is the foundation for multilateral collaboration towards low-carbon communities. This network includes the involvement of the various government departments responsible for design, construction, property management, finance and legal affairs, and also community residents. Through participatory consultation, the network resolves the various disputes that arise during the renovation of old communities, achieving inclusiveness of the diverse stakeholders' intentions during the renewal process. For example, a low-carbon renovation plan that has gained consensus among residents could be piloted on one site before being promoted community-wide, rather than implementing an untested plan across the entire community from the start. Additionally, residents should be allowed to adjust space layouts and facilities during and after construction, or even change or remove certain features, making them suited to their needs.

3. Reshaping resident participation in public spaces and promoting low-carbon lifestyles

In the effort to achieve low-carbon transformation of communities, engagement from residents holds considerable significance. Residents should be guided to gradually engage in the low-carbon renovation of micro public spaces, and encouraged to be involved throughout the entire project. During the process, it's crucial to create scenarios involving multiple stakeholders and enable residents to contribute to technical solutions for renovations. Platforms for mutual consultation and collaboration should be in place to mobilize residents, property management companies and other relevant parties to jointly explore low-carbon community-based upgrades. These endeavours can help residents to develop a sense of responsibility and commitment, embedding the awareness of sustainable lifestyles into their daily lives.

Nairobi, Kenya and Dar Es Salaam, United Republic of Tanzania
Developing Risk Awareness through Joint Action: co-designing weather and climate information services in urban informal settlements

Case background

Climate change presents increasingly complex extreme weather globally, with more frequent flooding, storms, heatwaves and droughts. With over 1 billion people living without a decent home worldwide, the urbanization process is driving many people to settle in informal settlements, on areas of unstable land more prone to climate disaster impacts. It is projected that 60 ~ 70 percent of Nairobi's population and over 70 percent of the population of Dar es Salaam live in informal settlements[1]; both of which

1 World Habitat Awards. DARAJA: The Inclusive City-Community Forecasting and Early Warning Service, Kenya and Tanzania. Available from: https://world-habitat.org/wp-content/uploads/2023/12/Project-Summary-DARAJA-The-Inclusive-City-Community-Forecasting-and-Early-Warning-Service-Kenya-and-Tanzania-.pdf (Accessed: 15/06/2024).

are urbanizing rapidly and experience frequent periods of intense rainfall and pluvial flooding. These communities frequently lack basic urban services and critical infrastructure such as paved roads, drains and sewers, making them highly vulnerable to the impacts of extreme weather. Exacerbating this, most people living in these informal settlements have no access to weather and climate information services, and those who do often face challenges in interpretation due to technological, linguistic or socioeconomic barriers. Critically, weather events have a disproportionate impact on women, children, the elderly and the less able, which will be further exacerbated by climate change.

Traditional meteorological services tend to focus on macro-level data, which often lacks specific information for urban microclimates and the localized nature of urban hazards from extreme weather. This gap in effective communication and actionable information hampers the resilience of the most vulnerable urban populations against climate-related risks. The issues not only threaten the lives and livelihoods of urban residents but also exacerbate existing social and economic inequalities. Developing Risk Awareness through Joint Action (DARAJA) operates as a weather forecasting and early warning service partnership that provides those living in Nairobi and Dar es Salaam's informal communities with reliable and regular climate information, helping to safeguard the livelihoods of residents by taking proactive preventative action ahead of major weather events. Designed to reach the most vulnerable urban residents, the initiative has actively worked to: (1) bolster the resilience of these communities by co-creating interfaces and services to address climate-related risks; (2) deliver reliable, co-produced and accessible climate information services to inform new planning decisions at the city and community level; (3) increase the use of tailored climate information services by people living in these urban informal settlements. By leveraging community networks and modern technology through the adoption of a systems-wide approach, DARAJA has built critical bridges and operational partnerships between key actors involved in the co-design of products, information dissemination channels and feedback loops for weather forecasts and extreme weather alerts.

Implementation process

1. Building a diverse network of stakeholders for co-designed climate and weather service delivery

Launched in September 2018, DARAJA is coordinated by Resurgence–a global design, communications and consulting not-for-profit social enterprise – with implementation led by the Kounkuey Design Initiative (KDI) in Nairobi and the Centre for Community initiatives (CCI) in Dar es Salaam. The project has received over USD 2 million in financing provided by: the United Kingdom of Great Britain and Northern Ireland Foreign, Commonwealth and Development Office; Weather and Climate Information Services for Africa; Climate KIC; the German Agency for International Cooperation; and UNDP Africa. By adopting a systems-wide, co-production approach, DARAJA has connected disparate actors including the National Meteorological and Hydrological Services, and community development organizations to work collaboratively for the first time.

Both CCI and KDI played essential roles in facilitating collaboration by connecting stakeholders and implementing pilot services and core project activities commencing in April 2019. To identify the core actors to be included in the process, mapping activities on information flows in the two cities was undertaken, dedicated to access, uptake and use of extreme weather and climate information services. Convening a wide network of actors, a number of stakeholder consultations, focus groups, design workshops, feedback sessions, household surveys and key informant interviews were subsequently initiated. Stakeholder consultation events brought together: residents from informal settlements, see Figure 5.4; city authorities such as water and sanitation departments; disaster management authorities and urban planners; media houses such as telecommunications companies; the Kenya Red Cross Society and the project Forecast-based Preparedness Action in Nairobi; plus school teachers and a test community in Dar es Salaam; the World Bank; and the Trans-African Hydro-Meteorological Observatory. Working in conjunction, stakeholders in both cities cooperated with their respective national meteorological and hydrological agencies, including the Kenya Meteorological Department (KMD) and the Tanzania

Source: Kounkuey Design Initiative. DARAJA. Available at: https://www.kounkuey.org/projects/daraja

Figure 5.4 Local residents participate in communication system design at a community training session in Kibera, Nairobi

Meteorological Agency. The integration of feedback loops between local communities and the National Meteorological and Hydrological Services (NMHS) not only allowed more closely aligned forecasting services with community needs, but also generated tailored and actionable forecasts, improving resilience at individual, community and city levels, whilst strengthening trust between NMHS and local residents.

2. Defining targeted communication channels to direct information dissemination

To effectively reach informal communities and maximize outreach, a broad range of communication strategies were developed. Following a survey, the most effective means of communication in Nairobi's informal communities, were radio (57 percent), television (49 percent) and SMS (32 percent)[1]. Community radio stations in the neighbourhoods of Kawangare, Kibera, Korogocho, Majengo and Mukuru, as well as a city-wide radio station and additional news organizations were used to deliver climate predictions, sharing daily updates and messages of advice regarding weather-related risks and challenges to create awareness among the communities. The Weather Mtaani Service functions as a core means of information sharing through local community leaders who together interpret and relay weather forecasts from KMD to the local community via SMS, phone and word of mouth. Trained by experts from KMD, local youths in particular, have leveraged the power of community radio stations to articulate climate change news, with over 24 individuals interpreting weather forecasts in Kibera alone. Daily weather forecasts, seasonal outlooks and weather warnings are translated on a weekly basis and disseminated to youth member volunteers in other informal settlements including Korogocho and Mukuru to enable comprehensive coverage of information across these communities. With a focus on ensuring

1 Resurgence. DARAJA: Impacts and Climate Ambition. Available at: https://www.resurgence.io/daraja/ (Accessed: 16/06/2024).

information is easily interpretable, the use of the local dialect, intuitive graphics and weather icons has also been promoted, along with forecasts for individual city zones and designated target settlements with expected impact descriptions. Common terminology and a shared understanding of the purpose was established at the start of the process in order to facilitate mutual understanding and embed a sense of ownership within the local communities, thus increasing service demand and use.

To further spread awareness on DARAJA, Resurgence and KDI contracted the highly regarded award-winning Kenyan filmmaker and photographer, Ondivow, to produce a short film to raise awareness on extreme weather. Through cinematography and storytelling, this has helped to disseminate knowledge and learnings from the project to a wider audience. In January 2021, the film was selected to premiere globally by organizers of the world's first Climate Adaptation Summit.

3. Facilitating behavioural change to strengthen community resilience

In addition to direct weather and climate information delivery, DARAJA has promoted behavioural change to help empower communities in preparing for extreme weather. Residents are encouraged to undertake cleaning works to stormwater drains, repair their homes and organize their belongings to strengthen resilience capacity. These actions are supervised and monitored by both KDI, CCI and seven other local partners. CCI has improved sanitation infrastructure by integrating concrete walls to reduce the risk of collapse during heavy rains and high winds, and they have introduced a number of sanitation options which if neglected would accumulate waste material and exacerbate the risk of pluvial flooding. Accordingly, 76 percent and 81 percent of interviewed respondents in Nairobi and Dar es Salaam respectively, felt that the action they took helped to save their household income and better protect their assets and valuables. Where issues such as clogged stormwater drains persist, community clean-up activities are also organized by Weather Mtaani leaders to protect neighbourhoods from flooding in advance of heavy rain alerts. With a focus on youth education in Dar es Salaam specifically, local schools have also prioritized educating children on how to protect themselves in extreme climate conditions, empowering young people through resilience building. With 8 pilot schools in the city, 19 teachers and 240 students were trained via a coordination programme, with a further 13,711 students receiving information by September 2020, see Figure 5.5 and Figure 5.6[1].

Source: https://world-habitat.org/es/premios-mundiales-del-habitat/ganadores-y-finalistas/daraja-servicio-inclusivo-y-comunitario-de-la-ciudad-para-el-pronostico-del-clima-y-la-alerta-temprana/untitled-800-x-500-px-17-2/

Figure 5.5 Prioritizing youth education on climate change, schools teach children about weather and climate-related risks to build resilience and adaptive capacity

1 Resurgence. DARAJA: Impacts and Climate Ambition. Available at: https://www.resurgence.io/daraja/ (Accessed: 16/06/2024).

Source: Global Disaster Preparedness Center. (2024). DARAJA: The Inclusive City-Community Forecasting and Early Warning Service. Available at: https://preparecenter.org/resource/case-studies-daraja-project/

Figure 5.6 Murals depicting the weather patterns in Kibera raise awareness on climate impacts among local children

DARAJA has made a critical contribution to bolstering urban climate resilience in some of Nairobi and Dar es Salaam's at-risk informal settlements, reaching over 982,000 residents[1]. By adopting a systems-wide, co-production approach between users and producers, the initiative has connected disparate actors from the National Meteorological and Hydrological Services to local community development organizations, stimulating collaboration for the first time. The meteorological services now possess novel models in which forecasting products reach a far broader set of end-users including the city's most vulnerable populations. The design of an inclusive communication system has enabled the dissemination of localized, timely early warning forecasts at different urban scales with user-centric daily and weekly forecasts. Respondent survey data indicated that within the first 18 months, access to advanced and accurate weather, early warning and climate information increased from 56 percent to 93 percent in Nairobi's informal settlements, with 98 percent of residents stating that they actively used DARAJA information services to prepare for high-impact weather[2]. Similarly in Dar es Salaam, access

1 Resurgence. DARAJA: Impacts and Climate Ambition. Available at: https://www.resurgence.io/daraja/.

2 Resurgence. (2021). Film on pioneering weather service for African communities premieres globally. Available at: https://www.resurgence.io/film-on-pioneering-weather-service-for-african-communities-premieres-globally/.

was reported to have increased from 74 percent to 93 percent, with 91 percent of respondents stating that they understood the information well.

Reference experiences

1. Facilitate systems-wide, co-produced approaches to weather and climate information services for urban informal settlements

DARAJA is one of the first projects to explicitly focus early warning information dissemination on urban populations in informal settlements, bringing together a wide network of national, regional and city-level actors. The project has highlighted the importance of adopting a multi-stakeholder, co-design process to generate innovative and effective means to prepare vulnerable communities. By using localized languages and icons delivered via trusted channels to the most vulnerable urban residents, the project has symbolized a clear transition from the 'official' channels used by government staff in which technical information is often mis-interpreted or it fails to reach these communities at all. DARAJA, therefore, challenges conventional and outmoded approaches to largely top-down early warning information sharing, and instead promotes cohesive dissemination and feedback across dense and complex urban networks. By connecting multiple actors, DARAJA has demonstrated an innovative model to foster a culture of mutual feedback which, along with science and technology, can be scaled and replicated for other vulnerable urban communities.

2. Promote innovative and diversified communication strategies to streamline information delivery to hard-to-reach communities

Where poor infrastructure, lower levels of literacy and reduced access to digital tools widen climate service information gaps in informal settlements, cities are pressed to innovate to bridge the divide. Capitalizing on a broad range of targeted communication channels, DARAJA has made evident the importance of diversified communication to effectively disseminate tailored information within hard to reach communities in Nairobi and Dar es Salaam. Major communication outlets such as community radio and television are operating as highly influential entities to convey climate information via localized broadcasting. By leveraging these telecommunications entities to facilitate the translation of weather information, DARAJA's approach has ensured the inclusive and timely delivery of tailored information to marginalized and peripheral urban communities who would otherwise have limited access to weather updates.

3. Encourage active youth participation in climate information service delivery

With a strong commitment to educating and training youth on weather and climate information services and climate risk, DARAJA reiterates the key role of young people as climate champions in building climate resilience at the local level. As active and dynamic community leaders, youth play a pivotal role in generating knowledge and awareness on climate risks in Nairobi and Dar es Salaam's informal settlements. With high levels of digital literacy, adeptness in utilizing social media platforms and inclinations towards volunteerism, cities can harness the skills of young people to share information through accessible channels, bridging information gaps between local residents and expert information. In turn, by empowering youth in climate information service delivery, this instils a sense of ownership and encourages skills building, producing more resilient and sustainable urban communities.

Yangpu District, Shanghai, China
Co-prosperity of youth and neighbourhood: sustainable renewal practice of Changbai neighbourhood 228[1]

Case background

Changbai neighbourhood 228 (CBN 228) is located in the industrial area in the north-east corner of Shanghai, covering an area of approximately 3.47

1 This case study is provided by the Changbai New Village Subdistrict Office of Yangpu District, Shanghai, and the Shanghai Yangpu Technology & Innovation Group. The authors are Zhong Xiaohua, Wang Hongyu and Feng Peiwen.

hectares. It is a workers' housing complex built in the 1950s as part of the "20,000-household" initiative[1]. There are also six 6-story public housing buildings constructed in the 1980s at the south-east and north-west corners. As a witness to the city's century-long industrialization process, this community carries the legacy of generations of industrial workers. However, with the emergence of issues such as high residential density, aging community facilities, poor environmental conditions and numerous safety hazards, this once vibrant community has gradually declined. The outdated facilities, including damaged exterior walls, poor drainage, low-quality public spaces and a lack of eating and shopping areas, significantly impact the quality of daily life and the neighbourhood experience. The community is now heavily burdened with elderly care and management of a large transient population, and its functional design and service offerings fail to take care of the needs of today's young people, making it difficult to attract them to settle. The loss of the collective memory and weakened sense of belonging has resulted in a lack of community identity and enthusiasm for participation among both newcomers and long-time residents.

As urbanization continues to progress, Chinese cities have shifted from rapid expansion to a stage of urban regeneration, with residents increasingly demanding higher-quality living environments and public service facilities. Against this backdrop, CBN 228 was listed as a Shanghai Urban Renewal Pilot Project in 2015. Through multi-stakeholder cooperation between the government, enterprises and the community, young to middle-aged planners, architects and heritage conservation experts actively applied green and low-carbon measures such as sponge city technology, modular construction and waste sorting to address climate change. By renovating old residences into community businesses, refurbishing old apartments and constructing new commercial housing, they created a combination of construction and supply modes that provided more living support, public spaces and employment opportunities for young people. Additionally, by encouraging youth participation in community cultural development, the project effectively improved the neighbourhood's living standards, enhanced community resilience and vitality, and promoted sustainable community development thereby breathing new life into this community of historical significance, see Figure 5.7.

Implementation process

Since 2019, through meticulous planning and well-organized construction, CBN 228 has not only preserved its historical features and spatial texture,

Source: All photographs included in this study are provided by Changbai Xincun Sub-district

Figure 5.7 Aerial views of CBN 228 before and after renovation

1 "20,000-household" refers to a type of worker housing built by the Shanghai Municipal Government in the 1950s, characterized by 10 units per floor, 2 floors total with brick exterior walls, wooden staircases and floors, and shared kitchen and bathroom facilities for every 5 households. A total of 2,000 housing units were built, addressing the housing needs of over 100,000 people.

but also added community and public service facilities, creating an open neighbourhood complex with a diverse range of businesses. The project has achieved significant results, including improving the living conditions of over 1,600 people in 360 families from the original two-story low-quality housing. The 815 extra households who live in the apartment buildings constructed in the 1980s benefit from the renewal as well. A new high-rise apartment building with 450 units has also been constructed, providing affordable housing for nearly 600 young to middle-aged workers. New public and commercial services now benefit 80,000 to 100,000 residents.

It is the charm of a city that draws in young people while it's the vitality of youth that the city's prosperity relies on. The youth community are not only proactive participants in neighbourhood development but also direct beneficiaries from neighbourhood renewal and transformation. The sub-district government and development enterprises closely collaborate to provide comprehensive support for youths in areas such as housing supply, life circle planning, facility support and employment opportunities, which meet the basic living needs of young people, providing them with ample room for further career development. The active participation of young people injects fresh vitality and innovative ideas into the neighbourhood, driving it towards becoming a more sustainable and inclusive urban community. From the negotiation and acquisition stage to planning and construction, business running and management, the sub-district government has maintained close communication and collaboration with young residents. Such a mutual-beneficial partnership is able to bring every member of the whole neighbourhood closer, and lay a solid foundation for cities' sustainable development.

1. Empowering young professionals to engage in every single stage of urban renewal

After taking over the project, the Shanghai Yangpu Technology & Innovation Group (Yangpu Group) – the project developer – adopted the suggestions of planners, architects and historical heritage conservation experts to optimize the construction plan. Under the optimized proposal, the original floor area ratio was significantly reduced, and through a combination of preservation, repair, merging and reconstruction, the architectural texture and historical features of 12 old buildings were retained, successfully preserving the collective memory of the previous industrial workers' neighbourhood. The project has also constructed a community centre that integrates a diverse range of public services including commerce, culture and leisure, providing residents with a rich and varied living experience. Beyond addressing the needs of residents and preserving historical culture, the team of planners and architects also actively practiced "green and low-carbon" and "resilient and sustainable" renewal concepts. For example, they employed various sponge city techniques to solve the neighbourhood's water logging, increased the size and number of public green spaces, and optimized the pedestrian system to create an open green neighbourhood.

The new talent (aimed at young professionals) apartment building, mainly constructed with prefabricated concrete components has a 60 percent assembly rate with the interior clad with a large number of bamboo fiberboards, thus reducing on-site wet work and minimizing dust and noise pollution. Abiding by the principle of "restoring old buildings as they were while upgrading them with new features", community planners from Shanghai AMJ Architecture and Urban Planning Co., Ltd. and Tongji University continuously refined the details of the planning scheme, maximizing the preservation of the white-walled and red-tiled features of CBN 228, and improving the supporting services in the neighbourhood. Architects applied modern design concepts and technical means to integrate historical and cultural symbols with modern functions in spaces such as a community museum and central lawn. The youth-led working team of Yangpu Group was responsible for the construction, leasing, long-term apartment operation and property management of CBN 228, providing strong support for the smooth progress of the project. This project has generated about 300 jobs for youth to work in community services, business and creative sectors, providing a career development hub for young professionals.

2. Creating a youth-friendly community through diverse supply

In creating a youth-friendly community, Yangpu Group constructed affordable long-term rental apartments –

Chuangyu 228 – whose 450 units are accommodating over 600 residents. This project, part of the effort to enlarge the supply of affordable rental housing, was developed to break inadequate accessibility to housing faced by new urban residents and young people. It offers more options for workplace newcomers to achieve a work-life balance, and ensures all-round and individualized affordable housing choices for young employees in the adjacent enterprises featuring internet-based?new economies. Young people are often met with significant uncertainty in the early stages of their careers, such as job changes and relocation, and affordable rental housing offers flexible lease terms and convenient termination mechanisms thus meeting the transitional housing needs of young people and allowing them to focus more on their career development and personal growth. Apartment managers now collaborate with local key enterprises and surrounding universities to promote housing security measures among young employees and students so as to enhance the region's appeal to young talents and drive regional economic development.

The affordable and well-equipped rental apartments meet young people's diverse needs with floors exclusively reserved for female tenants and others for pet owners. At the same time, great importance is attached to community culture by providing ample space for social activities, such as public lounges and rooftop gardens, where various social events are organized to enhance interaction among the youth. This is beneficial for their better integration into community life, more stable social networks and an increased sense of belonging. Additionally, in order to meet the "one-stop, multi-functional" needs of surrounding residents, especially the youth, CBN 228 has innovatively introduced a public-private partnership model for living services which covers community commerce, sports and fitness, as shown in Figure 5.8, cultural entertainment and daily services. Facilities within the neighbourhood such as a sports centre and community dining hall offer affordable quality services, attracting more young people to engage in local life.

Source: All photographs included in this study are provided by Changbai Xincun Sub-district

Figure 5.8 CBN 228's Fitness Centre

3. Building a youth employment facilitation platform through multi-party collaboration

CBN 228 not only caters to the housing and living service needs of young people, but also demonstrates, in terms of its functional configuration, a long-term plan and sustained investment in supporting the career development of youth, which is a commitment to facilitating the personal growth and professional development of the younger generation through a comprehensive support system. For instance, the employment and entrepreneurship support platform jointly established by the local government and enterprises not only provides physical spaces such as co-working space and an employment training centre, but also offers information, technology and financial support. The platform leverages internet technology to establish an online information exchange platform that enables young people to stay on track of market trends, policy shifts and other relevant information, thereby enhancing their market acumen. Also, the community actively collaborates with universities, research institutions and other entities to promote the integration of industry, academia and research, providing young people with more practice opportunities and innovation resources. CBN 228's collaborations with enterprises offer youth employment skills training and practical opportunities, encompassing zones for training activities, live-streaming recruitment and business negotiation, as well as co-working spaces, thereby helping to improve the local employment service system. The sub-district government and district-level investment promotion centre work together, widely collaborating with quality enterprises to regularly host job fairs. Currently, the project has established recruitment information-sharing partnerships with eight Global 500 companies and serves as a skills training centre for several enterprises. In 2024, through a combination of online and offline channels, approximately 342 individuals have undergone training, 149 job positions have been provided, and 3 entrepreneurial ventures have been supported. The project aims to retain young people by creating a favourable employment and entrepreneurship environment, thereby enhancing the area's competitiveness and sustainability.

4. Inspiring youth action through community culture

The renovation of CBN 228 fully preserved the spatial texture and appearance of 12 buildings from the 20,000-household initiative, recreating the material cultural space of the old industrial workers' neighbourhood. Meanwhile, a Workers' Neighbourhood Museum was developed based on the concept of heritage across three generations – the 1950s, 1990s and 2020s. A distinctive CBN 228 logo was also designed to strengthen the cultural identity of the area as shown in Figure 5.9. Young resident Mr Zhang Lei, who grew up in a 20,000-household community, personally experienced the process of retrospecting and presenting the collective memory during the urban renewal, which greatly enhanced his sense of community identity. He has since become a parttime community volunteer. Under the guidance of the sub-district office, young management personnel like Zhang Lei established the YOUNG Alliance platform, leveraging his expertise as an information engineer to create an information resource matching platform – the "Far-reaching Benefits of Intelligence" WeChat Mini Programme – which consolidates functions such as volunteer project release, display, enquiry and information disclosure. This platform aims to organize more youth volunteers, including community residents and white-collar workers, to actively participate in community volunteer services such as providing museum guide services, organizing cultural and sports activities, and maintaining public order.

Source: All photographs included in this study are provided by Changbai Xincun Sub-district

Figure 5.9 Sculpture of CBN 228 logo

Additionally, youth are the primary force in cultural preservation in CBN 228. They use various artistic forms such as drama and music to create and perform works related to the transformation of the area. For instance, Tongji University students and faculty created the original drama Warmth & Light and its theme song Symphony of Twenty Thousand Households. These works not only demonstrated the youth's deep understanding and emotional connection to the neighbourhood's history, but also enhanced the cultural cohesion of the area, see Figure 5.10.

Source: All photographs included in this study are provided by Changbai Xincun Sub-district

Figure 5.10 Drama performance at the Workers' Neighbourhood Cultural Festival

5. To lead a green lifestyle through youth participation

Based on housing assurance, employment facilitation and cultural identity, CBN 228 attracts more market entrepreneurs to the community with low space usage fees. This initiative not only creates a community-supported platform that integrates career development and emotional connection for young entrepreneurs and job seekers, it also cleverly breaks the rules of a traditional market pricing mechanism, showcasing a more humanized, community-oriented business model. Additionally, the sub-district government has established a multi-party governance alliance and developed a new model of "grid governance, covenant governance and joint governance" to formulate a neighbourhood covenant for strengthened rule-based governance. In 2023, Changbai Xincun sub-district government collaborated with the Fudan University, the University of Shanghai for Science and Technology, and others to host the Young Community Governance Competition, see Figure 5.11. Through various

Source: All photographs included in this study are provided by Changbai Xincun Sub-district

Figure 5.11 Final of the Youth Community Governance Competition

means such as participation in the competition, set-up of volunteer service teams, implementation of community-university partnership activities and practice of the "15-minute living circle" green life concept, young people actively engaged themselves in community governance and led green lifestyles. For example, by advocating waste sorting and organizing young volunteers to carry out publicity and guidance, the neighbourhood has seen much wider participation in and higher accuracy of waste sorting. Encouraging green commuting by setting up shared bicycle stations is also helping to reduce traffic pollution. All these community organizations and self-governance projects have enabled youth to contribute their power to the sustainability and good governance of the neighbourhood.

Reference experiences

The CBN 228 project has successfully mobilized young people to engage deeply in sustainable urban renewal and made them leaders in green and low-carbon community development by supporting self-growth, strengthening community identity and building governance networks. By exploring new and intriguing social interaction approaches and possibilities, the project attempts to transform political and theoretical discourses into those for youth, daily life and online activities. An attempt like this endeavours to make youth community engagement a new way of social interaction, and constantly discover, mobilize and assemble more "Youth Co-creation Partners" to realize youth-friendly communities, with the intention: to achieve increased development vitality and creativity in good governance of communities; to explore and practice strategies in response to climate change; and to promote green living. Being able to be carried over to other densely-populated urban areas, such a sustainable and inclusive development model has set a benchmark for efforts to establish youth employment facilitation platforms and move towards green and low-carbon communities.

1. Urban renewal improves the appeal of downtowns to youth

To encourage more youth participation, it is essential to create youth-friendly communities with adequate career opportunities. Providing diversified

affordable rental housing options is key to ensuring comprehensive personalized housing security for young people, particularly new graduates. Additionally, a public-private partnership model for living services meets the "one-stop" needs of young people. A model to foster vibrancy among young people should be created to facilitate youth engagement in community affairs, thereby leveraging their unique perspectives and open-mindedness to inject innovative thinking and diverse solutions into community decision-making. This approach not only makes community governance more responsive to real needs but also better meets the changing and diverse needs of residents.

2. Better integration of professional expertize and practice are needed for community development

Urban transformation and community renewal need to fully involve young professionals including planners, architects, social enterprises, artists, etc. Through in-depth research and communication with residents, community renewal plans should be carefully adjusted to incorporate green, low-carbon and resilient sustainability concepts, thereby creating new smart communities. In this process, the important role of young professionals in building community resilience should be highlighted by combining professional knowledge with the unique needs of young people. Beyond addressing basic housing needs, attention should also be given to young people's needs for healthy lifestyles and activities in promoting the construction of resilient communities that integrate needs, safety and vitality.

3. Cultural memory strengthens youth's community identity

Youth participation in community governance can begin with emotional involvement. To resonate emotionally with youth, it is necessary to develop their sense of community identity and belonging. Preserving and sharing the historical collective memory during neighbourhood renewal and renovation is an essential strategy for building community culture, strengthening youth identity and enhancing neighbourhood cohesion. In architectural design and neighbourhood renovation, it is important to preserve and restore historically significant buildings and incorporate modern design elements so as to create an environment that blends historical depth with contemporary vitality. Additionally, projects like neighbourhood history exhibitions, old photo displays and oral history sharing can be launched to stimulate young people's interest and love for the neighbourhood's history. Inviting older residents to share historical stories can also promote intergenerational exchange and cultural transmission.

4. Governance innovation empowers youth low-carbon action

Young people, as a significant force propelling social reforms, are highly sensitive and receptive to green lifestyles, with their influences and execution capabilities particularly crucial in pushing community green transitions and collaborative governance. From the establishment of governance platforms that connect government bodies, society and businesses, and through innovative activities and projects such as youth governance competitions and the set-up of volunteer service teams, young people help communities to promote green life concepts such as waste sorting and low-carbon travel, which encourages the active response and participation of all community members.

Youth-friendly community renewal not only revitalizes an old neighbourhood but also creates a new one with a genuine community centre. While there are numerous examples of creating various centres such as commercial and transportation hubs, the transformation of flat residential areas into an activity centre that works as a magnet for all community residents is a rare case even in Shanghai. The CBN 228 renovation project, which successfully turns a sense of community belonging into the experience in effective space utilization from day to day life, holds exemplary value in the creation of social spaces.

Hong Kong, China
Green Hub: leading low-carbon lifestyles with green transformation of historic buildings

Built in 1899, the old Tai Po Police Station is situated on a small hill at Wan Tau Kok in Tai Po, Hong Kong. In 2010, the now defunct police station complex was incorporated into the Revitalizing Historic Buildings Through Partnership Scheme by the Hong Kong Specialist Administrative Region government (HKSAR Government). It was transformed in collaboration with Kadoorie Farm and Botanic Garden into a multifunctional cultural and leisure venue called the Green Hub. This rejuvenated complex now serves as a base for promoting sustainable ways of living, focusing on rebuilding a harmonious relationship between individuals, society and nature. It advocates for a "help people help themselves" community collaboration model to encourage the public to adopt a low-carbon lifestyle, setting an example of ecological civilization where humans and nature coexist harmoniously.

1. Sustainable regeneration of historic buildings

The Green Hub uses an integrated conservation strategy to harmonize buildings with nature while preserving their historical, architectural and ecological features. Restoration plans emphasize the conservation needs of architectural characteristics, revitalizing original spatial layouts, natural ventilation and lighting, which are key elements of green building design. The century-old tree-lined areas were seamlessly integrated into the ecological landscape, with careful attention given to the preservation of the adjacent egret breeding grounds. Since its opening in 2015, the Green Hub has often been described as an oasis in the city and is widely regarded as a model of sustainable landscaping and green architecture. It has received numerous accolades including Honorable Mention for the UNESCO Asia-Pacific Heritage Awards, the Hong Kong Green Building Award and the Special Recognition Award for Ecological Environment Service Construction Network. In 2021, the Old Tai Police Station was declared a monument.

The Green Hub keeps low-carbon transformation as its operational goal. Its "Eat Well Canteen", which adheres to low-carbon principles, won the Gold Award in the Hong Kong Awards for Environmental Excellence in 2017. The overall operation of the Green Hub also showcases many low-carbon management measures including energy-saving design, green procurement, waste reduction at source, resource recycling, zero food waste, the use of recyclable tableware, ecological landscaping and green event planning.

2. Empowering youth climate action through education

The Green Hub serves as a diverse educational base, primarily targeting youth, providing strong support for achieving the national "dual carbon" goals and the Hong Kong's Climate Action Plan 2050. The core projects include:

(1) Green living courses. Through activities like the "Eat Well Canteen Workshop", the Green Hub teaches citizens how to practice low-carbon living as a response to climate change. The courses combine interactive games, garden exploration and experiential cooking activities, allowing participants to understand and implement low-carbon living strategies, thereby enhancing their awareness of environmental protection.

(2) Carbon pioneer training. The Green Hub offers pioneer training, creating materials like the "Carbon Neutrality Action Cards" to encourage youth to apply carbon audit concepts in their homes and schools to become pioneers of carbon neutrality. It also participates in “Towards Carbon Neutrality Greater Bay Area Youth Activities”, strengthening exchanges and cooperation between students in the Guangdong-Hong Kong-Macao Greater Bay Area to jointly promote the achievement of carbon neutrality goals.

(3) Carbon Neutral Challenge. Launched in 2022, this initiative sets 15 starting points for lifestyle actions, collecting creative proposals for carbon reduction. Its activities, including lectures, workshops and community sharing sessions, attracted significant participation from schools, organizations and the public. A total of 56 events were held in collaboration

with 78 schools and organizations, involving over 8,700 participants, see Figure 5.12. More than 160,000 pledges to reduce carbon emissions were collected, raising public awareness of the risks associated with climate disasters.

Source: Provided by the Green Hub

Figure 5.12 College interns at the Green Hub guide their peers through the station's low-carbon designs and share their experiences in practicing green living

Marrakech, Morocco
Pikala Bikes: building a cycling culture and livelihood opportunities through eco-guide training

With a strong dependency on motorized transport across Morocco, some 65 percent of the national population have lacked access to sustainable mobility options[1], with cities ill-equipped in key cycling infrastructure such as bicycle lanes and parking racks. The city of Marrakech, in particular, has witnessed high levels of air pollution from vehicles and has experienced long-term youth unemployment and a

1 Ecohustler. Pikala Bikes – a Cycling Revolution in Marrakech. Available at: https://ecohustler.com/technology/pikala-bikes-a-cycling-revolution-in-marrakech.

lack of sustainable tourism opportunities. In 2016, the Pikala Bikes initiative was launched in the city by the Dutch social entrepreneur Ms Cantal Bakker following successful crowdfunding through the 1 percent club platform; an online platform committed to raising public funds for sustainable impact projects contributing to challenges related to the SDGs. To effectively enable its operation, the government of Morocco offered rent-free space for the Pikala Bikes workshop which serves as essential support for the establishment and continuation of the initiative. The workshop runs as a multi-functional learning commercial centre and is used for bicycle mechanic training, traffic safety workshops for schools, cycle training classes, rentals and guided tours as well as community outreach programmes and retail sales.

Source: The Pikala Bikes initiative in Morocco. Available at: https://qantara.de/en/article/pikala-bikes-initiative-morocco-more-mobility-more-confidence-more-freedom

Figure 5.13 A young man attends a mechanics lesson at Pikala Bikes

As a powerful social project promoting eco-friendly transportation, Pikala Bikes is a multi-functional bicycle infrastructure initiative, simultaneously training and employing local urban youths within the sustainable mobility sector. The initiative educates young people on road safety and bicycle mechanisms, and provides them with employment opportunities. Multiple green jobs have been generated for local people as tour guides, delivery drivers, social project managers and bicycle mechanics that actively train local youth and school dropouts, see Figure 5.13. By applying such a pedagogical approach as well as the experience of Pikala Bikes in the field, the project has enabled young Moroccans to become certified eco-guides in Marrakech, with 45 young people currently employed[1].

Since its inception, Pikala Bikes has taught 650 women how to cycle and educated 23,000 children, with over 400,000 participants involved in Pikala Bikes events[1]. The initiative has also helped more than 270 rural students to access their schools via bicycle, unlocking a path towards a more opportunistic future for such disadvantaged populations in Morocco[2]. As an eco-friendly mode of transportation, cycling is helping to curb greenhouse gas emissions and air pollution, therefore actively contributing to local climate mitigation efforts. It is also fostering a culture of eco-consciousness and healthier lifestyles among the local population, in particular young people, which in turn is reducing resource consumption and lowering the carbon footprint. Where many bikes are abandoned in the Kingdom of the Netherlands and imported into Morocco for re-use, Pikala Bikes is effectively upcycling unused materials as part of a closed-loop system.

Following considerable success since its establishment, Pikala Bikes has received support from the TUI Care Foundation, the Dutch Ministry of Foreign Affairs and the DHL Group. The initiative is now expanding to other Moroccan cities including Rabat, Agadir and Casablanca, reflecting a growing demand for eco-friendly cycling culture across the country. With particular emphasis on promoting cycling amongst women as a means of empowerment, it has increased the facilitation of targeted training and workshops in this domain – 40 percent of Pikala Bikes employees and volunteers are now female, see Figure 5.14. Demonstrating the impact of integrated cycling

1 Pikala Bikes. Available at: https://pikalabikes.com/.

2 Infrahub, Africa. Pikala Bikes. Available at: https://www.infrahub.africa/case-studies/pikala-bikes.

infrastructure and mainstreaming a cycling culture among Morocco's urban youth, Pikala Bikes has made considerable strides to fostering an eco-conscious culture built upon sustainable mobility, advancing climate resilient urbanization across the country.

Source: Pikala Bikes. Available at: https://pikalabikes.com/

Figure 5.14 Young women take part in cycling activities as part of the Pikala Bikes initiative

Policy suggestions

As highlighted by the case studies and practices, it is evident that youth, through social support, professional training and empowerment, play an active role in addressing climate change and promoting social sustainability. The following policy suggestions are therefore proposed to enhance the environmental awareness and climate action capabilities of youth, thereby promoting localized low-carbon living, social inclusion and local development:

1. Integrate resources to foster sustainable community renewal

In the context of escalating global climate change, it is imperative for governments to collaborate with multiple stakeholders and integrate resources to promote sustainable community renewal through public-private partnerships. This approach aligns with the SDG 11, which is focused on building sustainable cities and communities. With adherence to the course towards green communities, localized sustainable development is sure to move forward. For example, in the process of urban renewal and residence rehabilitation, governments should provide

policy support, infrastructure construction and public services. Enterprises and foundations are required to offer funding and technical support, and cross-sector social organizations should provide professional services, training and supervision. Such collaboration can engender the eco-friendly transformation of community spaces, achieving mutual benefits for all parties implicated. Governments can also encourage social capital participation in green community renovation projects by alleviating public fiscal burdens through tax reductions, subsidies and commercializing community assets. In addition, to empower youth action through professional training, foundations, schools and businesses can establish Seed Funds or distinctive awards within community partnership projects to support youth in implementing low-carbon technology and social innovation projects thereby stimulating the practical application of such solutions. Youth can not only gain practical skills and valuable experience by participating in community renovation projects, but also showcase their creativity and practical abilities in fields such as green architecture and environmental design. This will help them to develop into key players in the green development of their communities.

2. Establish youth-driven community deliberation networks and collaboration mechanisms

Establishing cross-sector collaboration mechanisms that encourage the active participation of youth in community deliberation networks is key to enhancing the sustainability of low-carbon actions at community level. Various stakeholders, including communities, governments, social organizations, businesses and foundations, need to build cross-sectoral collaboration networks while ensuring that the voices of youth are fully heard and considered in community policymaking and implementation processes. In these contexts, youth can not only contribute their wisdom and strength, but also learn and grow through the problem-solving process.

Firstly, establish community forums, public consultations, deliberation councils, workshops, community festivals, proposal collections and digital platforms to encourage youth to fully engage in community decision-making and contribute to solving real community problems through inclusive discussions. Youth and experts should be organized to discuss and research topics such as community space renovation and waste sorting, propose feasible low-carbon community construction plans, and incorporate these research results into policy formulation and implementation. Secondly, encourage youth social organizations to play professional and bridging roles in order to coordinate resources and ensure the sustainable implementation of low-carbon actions in communities. For instance, university students, professionals and residents should be encouraged to jointly participate in community space renovation, thereby promoting community integration and low-carbon lifestyles. By linking public service elements and business economic resources through community social organizations, community resilience and governance effectiveness can be enhanced.

3. Promote carbon auditing and carbon neutral education programmes

Develop education and training programmes to cultivate youth into pioneers of carbon neutrality so as to enhance their environmental awareness and practical abilities. Firstly, to strengthen support for green education and green jobs, promote environmental education courses in schools and communities to enhance awareness of climate change among youth and equip them with basic skills in low-carbon technology, green life and social innovation. Drive the development of green industries by creating more job opportunities in community low-carbon economy such as green building, environmental transportation, the circular economy and nature education. Through collaboration with businesses and social organizations, provide internships and employment opportunities to help youth turn their knowledge and skills into practical action and personal development opportunities. Secondly, introduce carbon auditing concepts into households and campuses. Governments can establish and implement green community standards and promote "zero-carbon community" certification by assessing community performance in areas such as energy use, waste management and green building. Aligning with the SDG 12 Responsible Consumption and Production, develop educational resources and toolkits in collaboration with professional institutions and businesses in order to teach youth how to quantify and reduce carbon emissions. Additionally, promote

interregional youth exchanges and cooperation on low-carbon actions, and foster the formation of cross-regional youth low-carbon action alliances to expand the influence of low-carbon concepts.

4. Encourage youth participation in inclusive community governance

Integrate the concept of justice education into climate action by focusing on the impact of climate change on vulnerable groups and encourage youth to actively participate in inclusive community governance to promote social integration. Firstly, advocate for community mutual aid mechanisms, such as neighbourhood assistance and community resource sharing, to strengthen trust and cooperation among residents, thereby promoting sustainable community development. Youth can drive the implementation of these mutual aid mechanisms through volunteer service and social projects such as waste sorting and green transportation. These activities will not only enhance community cohesion but also improve overall community resilience and promote the widespread adoption of green lifestyles. Secondly, provide policy support to encourage collaboration between youth and vulnerable groups. Through social organizations and community projects, youth and vulnerable groups should be encouraged to jointly participate in climate actions such as conducting education and action on extreme weather preparedness in informal settlements, thereby enhancing overall community resilience.

By integrating resources from public-private partnerships, cross-sector social organizations, foundations and local communities, youth participation in low-carbon lifestyles and community governance can be encouraged, thereby promoting social integration and local development while advancing the global climate governance goals. These policy suggestions can not only enhance youth environmental awareness and social responsibility, but also contribute to achieving the SDGs through practical actions.

Chapter 6

Environment: youth participation in building low-carbon and resilient cities

Introduction[1]

Climate change is a key focus of the SDGs with Goal 13 (Climate Action) explicitly calling for urgent action to address climate change and its impacts. The goal underscores the need for countries to incorporate climate change measures into national strategies including disaster response mechanisms and climate-related education. It also clarifies the shared but differentiated responsibilities of developed and developing countries in addressing climate change. The SDGs emphasize the importance of global cooperation, as climate change is a worldwide challenge that requires collective efforts from all countries for an effective response. Youth engagement in addressing climate change is not only a reaction to current issues but also a demonstration of their responsibility toward the future of society. Young people have a greater understanding of and adaptability to new technologies, ideas and information. They can contribute innovative thinking in the field of climate governance to drive technological advancements and industrial upgrades. For instance, in areas such as renewable energy technologies, carbon capture and storage, and climate-adaptive agriculture, youth can propose new solutions and approaches to provide strong technical support for climate governance. Their long-term perspective ensures that future generations inherit a more livable, prosperous planet.

In terms of urban development, guided by youth and their efforts in combating climate change, our cities will become greener, more resilient, livable and ecologically sustainable. Low-carbon development path and nature-based resilience strategies are critical to drive forward sustainable urbanization. Their deployment and implementation are not only crucial to address climate change and enhance urban resilience, but to also instil coordinated and aligned socioeconomic development. For example, the low-carbon development path helps alleviate global climate change by reducing greenhouse gas emissions thus protecting natural ecosystems and the human living environment. Low carbon development promotes the optimization and upgrading of energy structure, industrial structure and technological structure, and facilitates the transformation of the economy towards a green, low-carbon, efficient and circular direction. In addition, resilience strategies based on nature enhance the city's ability to resist and recover from natural disasters such as floods, droughts and heat island effects by constructing ecological infrastructure such as wetlands, green spaces and forests.

In this chapter, we will explore and analyse various dimensions, including urban greening, mine restoration and development, pocket park construction and youth climate action advocacy. The first case study will focus on the urban greening initiative in Liverpool, United Kingdom of Great Britain and Northern Ireland, discussing how the city, anticipating more frequent and severe climate impacts in the future, such as extreme summer heat, localized flooding and biodiversity loss, has proactively implemented a series of forward-looking plans and initiatives to address these uncertainties. Case study two will describe how Hong Kong, China, through careful design and construction, transformed an abandoned mining area into a resilient, green and livable eco-sustainable community. The third case study will discuss how the Xuhui District of Shanghai, China, a core area of a megacity, provides more green ecological spaces and public services for community residents in a land-scarce environment by placing pocket parks near residents' homes and communities to better implement the people-oriented urban development philosophy and refined governance approach. Finally, we will highlight the Youth Advocacy for Climate Action (Y4CA) programme in Bandung, Indonesia, as a special boxout. This programme empowers local youth aged 15 ~ 24, promotes the concept of "co-creation" and offers valuable experiences in supporting 10 youth-led organizations dedicated to social and environmental actions.

1 This chapter was jointly written by Tongji University, UN-Habitat, and the Development Bureau of the Government of the Hong Kong Special Administrative Region of the People's Republic of China (DEVB). The Liverpool case study and the Indonesia case study were written by UN-Habitat. The Hong Kong case study was contributed by DEVB. The Shanghai case study was co-authored by a team led by Dr. Chen Haiyun from Tongji University.

Case studies

Liverpool, United Kingdom of Great Britain and Northern Ireland
The URBAN GreenUP initiative

Case background

Located in the north-west of the United Kingdom, Liverpool has a rich industrial heritage accommodating over 900,000 inhabitants. Like many other major urban centres in the country, it is faced with sustainably managing its urban form whilst pursuing economic development agendas and ensuring an attractive and healthy city for residents and visitors. Socioeconomic and ecological dimensions are frequently out of sync with political mandates, resulting in conflicting urban development plans. With increased densification and extension of the urban footprint, the city has witnessed growing fragmentation of its urban systems, disconnecting people from workplaces and amenities whilst also undermining the integrity of natural ecosystems. These issues combined have reduced the innate resilience capacity of the city's urban systems to effectively cope with both climate change and socioeconomic transition.

Projected to face more frequent and severe climate impacts including increased extreme summer temperatures, localized flooding as well as biodiversity loss, Liverpool is pressed to adapt to a number of converging environmental challenges. Accommodating an antiquated and inadequate drainage system of over 150 years old, it is the fourth-most at risk city to surface water flooding in the United Kingdom, directly impacting approximately 486,000 residents[1]. Large-scale development has resulted in a loss and fragmentation of green space and declining biodiversity through habitat destruction. These impacts pose critical knock-on effects for residents living in urban areas with multiple indices of deprivation, in particular, those who are more susceptive to flooding, heat waves and poor air quality, and who often experience higher rates of cardiovascular and respiratory disease with fewer financial resources meaning that they are often unable to pay for risk insurance in the event of extreme weather events.

Leading as a front-runner city in the United Kingdom, Liverpool has sought to re-nature the urbanization process by leveraging innovative nature-based solutions (NbS) to help navigate these inter-connected challenges, whilst maintaining optimal urban functionality to ensure a high quality of life. Serving as a blueprint for intelligent urban greening, Liverpool joined the European Union-funded, Horizon 2020 URBAN GreenUP research-based initiative in June 2017 as part of the Liverpool City Green Infrastructure Strategy, aiming to accelerate the roll-out of green infrastructure, renature urban plans, enhance connectivity and generate responsive solutions to climate impacts. Functioning as a living urban learning laboratory, the initiative has trialed new possibilities, identified new strategies and demonstrated the opportunity for new technologies for NbS development in the city.

Implementation process

1. Retrofitting integrated nature-based interventions

Operating with low-cost, sustainable methods to address localized climate change challenges in line with the growing pace of urbanization, the URBAN GreenUP initiative has focused on retrofitting, with more than 40 NbS projects in mapped locations across the city deemed to be most effective for integration. Components such as living green roofs and walls, rain gardens, water retention ponds, experimental pollinator spaces and verges, as well as innovative floating ecosystem islands, mobile pop-up forests and urban forestry were all deployed as part of a comprehensive greening strategy.

Working symbiotically city-wide, the interventions were split into four core groups: (1) large-scale re-naturing solutions covering vast urban areas to mitigate climate change effects; (2) singular green infrastructure solutions tackling acute environmental issues in

1 AIPH. Liverpool, UK: The URBAN GreenUp of Liverpool. Available at: https://aiph.org/green-city-case-studies/liverpool-uk-urban-greenup/.

specific urban areas; (3) water interventions reducing the effects of heavy rainfall and flooding; and (4) non-technical interventions to more closely engage people with Liverpool's greening mission.

Green walls were installed across the front of Parr Street car park, as shown in Figure 6.1, and at St John's shopping centre. The former comprises a 132 m^2 living surface of fronds, foliage and flora, with over 12,000 plants and flowers, whilst the latter is 165 m long; now one of the longest green walls in the United Kingdom with over 14,000 evergreen plants. To enhance urban connectivity, three new greenway routes (contributing to a 4.3 km green travel route) linking green-infrastructure elements now encourages soft modes of active travel such as walking and cycling, whilst interpretative signage helps to explain the benefits to route users, see Figure 6.2.

Source: Viritopia. (2020). Parr Street. Available at: https://www.viritopia.com/learn/case-studies/parr-street

Figure 6.1 A retrofitted living exterior wall incorporating native species of flora on Parr Street, Liverpool

Source: URBAN GreenUP Project for UNESCO World Heritage Site Liverpool. Available at: https://flaviagoldsworthy.co.uk/projects/liverpool

Figure 6.2 Signage provides people with further information on greening interventions

Two ecosystem islands were also established at Liverpool's historic waterfront at Wapping Dock and Sefton Park, see Figure 6.3.

The URBAN GreenUP initiative has made a considerable impact on the city's environmental quality and resilience. Over 5,200,000 litres of stormwater has

Source: Biomatrix Water. New Floating Estuarine Ecosystem Launch. Available at: https://www.biomatrixwater.com/news/new-estuarine-floating-ecosystem-launch/

Figure 6.3 Floating estuarine ecosystem islands create unique multi-level habitats in Liverpool's historic waterfront at Wapping Dock

been diverted from traditional sewers with NbS serving to regulate water flow and volume, building flood resilience whilst also improving water quality by enabling the natural filtration of particular heavy metals and nutrients. Where urban sink sites cater for stormwater, they accommodate a diverse array of aquatic plants including submerged, emergent and peripheral species, with supplementary woodland and pollinator sowings at certain locations. Green infrastructure elements such as living facades and street trees have also contributed to air purification and thermoregulatory control, sequestering over 155,000 kg of CO_2, reducing particulate matter and nitrogen dioxide, and modelled predictions in reducing peak summer surface temperatures by up to 7.5 ℃ on hot days. Biodiversity and pollinator counts have also risen by up to 920 percent at specific sites[1]. Regarding socioeconomic impacts, the development of green routes has helped to cut pollution and encourage healthy modes of active travel, simultaneously improving mental and physical health and well-being, whilst businesses have reported multiple benefits with 82 percent viewing greening as beneficial, 94 percent rating green areas twice as highly, and 92 percent claiming that street trees have led to an increase in footfall and trade. Greening has also fostered new community-oriented initiatives such as the development of the iNaturalist species identification app, physical and mental health programmes, citizen science events and volunteer opportunities.

2. A collaborative, multi-stakeholder approach to project development

Broad and proactive consultation comprised a key factor in the success of the initiative. To ensure project outcomes were responsive to the needs of local communities and that benefits were dispersed widely, URBAN GreenUP was designed and implemented with the active engagement of multiple stakeholders including governmental agencies, educational and business enterprises, community groups and residents. Project officers utilized a range of methods for participatory engagement including drop-in sessions, street and postal surveys as well as online outreach. Sustained dialogue was also ensured with city council colleagues in areas including legal and procurement, highways, drainage, public health, parks, and regeneration and planning, as well as external utility providers, environmental regulators and statutory bodies to gain the necessary licences and permissions for approval.

With widescale project support, a number of entities assisted in practical aspects of project implementation, whilst local procurement was prioritized to minimize fuel miles. The Merseyside-based environmental charity Faiths4Change, for example, helped to clear an overgrown plot to create a small church garden which has since developed into a large food growing area. This now provides a sustainable livelihood source for the charity and a valuable resource for the local community, offering training to local people on horticultural skills and placement opportunities for referrals by social workers. The Friends of Parks group has also provided support via integrated civil and NbS works to mitigate flooding in parks, and unlocked opportunities to enhance their accessibility and integrate wildflower planting, with a dedicated group who trained in water safety to care for a freshwater island. With the local landscape design contractor ReShaped, experimentation was undertaken to ensure sustainable approaches to biodiversity planting, and the large retailer Liverpool ONE partnered with the initiative to launch follow-up greening work across its wider estate and with its commercial buildings and tenants.

3. Designing regenerative and self-maintaining greening solutions

URBAN GreenUP mainstreamed sustainable practices throughout project implementation phases. Together, stakeholder engagement, sustainable design principles and contingency planning have all ensured the longevity of individual greening projects. With wide engagement, certain site interventions were incorporated into council maintenance programmes, whilst others were adopted by third-party land and business owners via legal agreements. Community

1 AIPH. Liverpool, UK: The URBAN GreenUP of Liverpool. Available at: https://aiph.org/green-city-case-studies/liverpool-uk-urban-greenup/.

groups also adopted some of the sites, with business sponsorships secured for others. Opportunities were provided to staff and partners to shadow maintenance visits, and short and long-term maintenance manuals were developed as part of the brief, helping to ensure that stakeholders were aware of their responsibilities and that the necessary skills and knowledge were in place. In regard to sustainable design, planting mixes were assorted to provide life cycle forage (with trees that could survive over 100 years in situ) and habitat for pollinator species. Planting density and components were also specifically designed to grow together, outcompete invasive species and form a low-maintenance succession community, serving to offer sustained benefits with minimal intervention. A 10 percent contingency spend and longer project delivery times were incorporated into the overall budget to allow for unexpected costs and delays.

With demonstrated impact since inception, the initiative has formed a groundbreaking "renaturing urban planning" approach, utilizing multiple geographical data layers to maximize the impact of NbS implementation in cities. Under this approach, a baseline assessment is first performed considering national, city and local policy marking the first step in the process of renaturing urban planning while providing an overview of the social, economic and ecological resource base. Subsequently, existing green infrastructure networks were analysed in the city to diagnose pinch points for NbS intervention. The analysis was carried out under four themes: (1) a sustainable city; (2) a cool city; (3) a healthy city; (4) a biodiverse city, ultimately developing an evidence base upon the baseline assessment. Following the identification of the pinch points, targeted green-infrastructure solutions could be selected, maximizing their impact where overlapping issues such as flooding and biodiversity occur.

4. Harnessing data to monitor and report greening impacts

Underpinned by a comprehensive monitoring framework, the contribution of individual NbS on environmental, social and economic sustainability were assessed using 40 European Union EKPLISE key performance indicators. Together, these covered a range of issues spanning climate mitigation and adaptation, water and green space management, air quality, urban regeneration, participatory planning and governance, social justice and cohesion, public health and well-being, as well as economic opportunities and green jobs. Using official standardized methodologies, data was collected by a monitoring officer using modelling tools or direct access from the source. Novel modelling technologies were also tested including remote, solar-powered, continuous air quality monitors as well as soil life sensors installed into trees and raingardens as part of sustainable drainage systems. Baseline and monitoring data was uploaded to the European Union Zenodo database in May 2023 to ensure open access, and Liverpool integrated a free and easy-to-use data portal for the city. Case studies for different NbS have also been produced, generating information on costs and procurement, as well as the benefits and challenges of each.

Facilitating knowledge transfer, data has allowed researchers and practitioners globally to learn from the initiative and replicate similar schemes in their own urban contexts. Key learnings from the URBAN GreenUP initiative have since influenced Liverpool's new public realm masterplan which is supported by a supplementary planning document, whilst legislative amendments such as Biodiversity Net Gain and Local Nature Recovery Strategies have also been established. The works have also secured additional follow-on green recovery funding, with work replicated across five key sites including the introduction of a floating ecosystem island in a park lake to enhance water quality, the delivery of an inexpensive green wall at a food hub, a park system water sustainable drainage system, and shaded pollinator walkways and spaces. Liverpool City Council and Mersey Forest have collectively built a platform on which to build for the future, with legacy NbS sites demonstrating success in delivering long-term benefits and enhancing city resilience.

Reference experiences

1. Recognize the importance of political will and flexible policy framework to experiment with nature-based solutions

Political incentive is crucial for the successful implementation of urban NbS, in which municipalities

must be backed by supportive policies and regulations as part of committed long-term urban development strategies. Accordingly, it is important that local governments align elements such as zoning laws and building codes with green infrastructure mandates to incentivize the implementation of nature-based approaches in urban development. However, where successful implementation is not possible without sufficient funding, obtaining adequate investment is essential for both the development and maintenance of NbS. By cultivating a strong political commitment, cities can help to secure the necessary partnerships with the private sector, academia and NGOs to acquire the required financial resources and technical expertize.

2. Promote the integration of nature-based solutions via retrofit into existing urban infrastructure for climate-resilient development

As a central premise to the initiative, green infrastructure retrofit into Liverpool's existing urban infrastructure allowed for cost-effectiveness, implementation ease and reduced resource use in delivering NbS. By modifying existing structures, retrofitting allows municipalities to avoid the high costs associated with demolition, construction and land acquisition, preserving natural elements and producing flexible solutions in resilience building and sustainable urbanization. It is now well-recognized that NbS play a key role in urban climate change adaptation, regulating microclimates, managing stormwater, improving air quality and energy efficiency, and enhancing infrastructural durability to climate impacts. It is therefore vital that urban practitioners understand these tools as versatile, multi-functional and scalable resilience-building components in managing complex climate change impacts in urban areas.

3. Actively monitoring the impacts of urban nature-based solutions

Whilst the concept of nature-based benefits is not new, the value of ecosystem services and natural capital is less widely recognized. Data produced through the URBAN GreenUP initiative has helped to fill a critical gap in scientific literature, generating a core evidence base quantifying environmental, social and economic benefits. It has helped to develop a European Union wide reference framework for NbS integration, reinforcing the importance of re-naturing urban regeneration programmes. Baselines can help cities and towns to set measurable targets for climate resilience and adaptation goals, where tracking capabilities can better highlight areas of progress. Real-time monitoring allows for the continuous assessment of NbS performance, enabling adjustments and optimization in regard to aspects such as the location and typology of interventions, to maximize their effectiveness climate change adaptation. Municipalities globally are therefore encouraged to assess the performance of their own nature-based interventions to strengthen evidence-based decision-making among urban policymakers and planners.

Hong Kong, China
Development of Anderson Road Quarry Site

Case background

Though small in size, Hong Kong accommodates a population exceeding 7.5 million, making it a highly developed and densely populated international metropolis. To enhance socioeconomic development, particularly in regard to the demand for housing, the Government of the Hong Kong Special Administrative Region (HKSAR Government) continues to develop new land resources. The former site Anderson Road Quarry is a large piece of land on the fringe of the urban area newly developed by the HKSAR Government in recent years. Since the 1950s, the quarry has supplied construction materials such as asphalt, stone and concrete, making significant contributions to the development of Hong Kong, with quarry operations recently ceased in 2017.

The HKSAR Government has redeveloped the ex-quarry site of approximately 40 hectares into a new community comprising of housing, business and recreational facilities which holds the capacity to accommodate a population of some 30,000 residents.

Implementation process

1. Public engagement in planning

During the planning process for the new community,

the relevant authorities were committed to the principles of sustainable urban development in order to strengthen the resilient capacity of the new community in light of acute climate change risks. They held a number of conferences, public forums and roving exhibitions on sustainable urban development, carbon-neutrality and urban resilience to generate robust and future-proofed development proposal; with particular focus on soliciting views from the public, notably young citizens, see Figure 6.4.

Source: Provided by Civil Engineering and Development Department, the Government of the Hong Kong Special Administrative Region

Figure 6.4 A planning lecture attended by local residents

Following the collection and analysis of public opinions, the authorities committed to reserving approximately 15.5 hectares of land for the provision of parks and flood storage facilities to provide residents with multifunctional green and recreational spaces, which also serve to mitigate climate-induced flood risk. The flood storage facilities are designed to comply with the standards of heavy rainfall as set out in Hong Kong's building codes, which will significantly reduce the peak discharge and therefore, alleviating the burden on urban drainage systems in neighboring communities downstream. In addition, the new community features comprehensive pedestrian connection facilities aiming to encourage residents to pursue sustainable and healthy modes of urban transit, reducing their reliance on vehicles while also alleviating traffic congestion across neighboring communities.

Designed as a medium-sized development, the new community has been zoned with residential blocks to the south and north, a civic core located in the center, and green pedestrian corridors connecting these areas, boosting the quantity of urban green space. Along with commercial and government facilities to be provided in the civic core, recreational areas and a plaza will also be provided for use by both residents and visitors. Moreover, the outline zoning plan for the community has imposed building height restrictions to preserve the views of the unique landscape of the former quarry site and the nearby ridgelines.

In order to pay tribute to the historical significance of the quarry, the new community will feature a Quarry Park. The HKSAR Government held a design ideas competition to gather proposals to divide the Quarry Park into four zones with reference to the operational procedures of the quarry, namely a cutting zone, grinding zone, blasting zone and bonding zone. Relevant quarry-themed elements and artistic and architectural featured installations will be integrated into the facilities in each of the zones, along with equipment for recreation, fitness and sports, enabling the park to cater for residents of all ages and their diverse needs.

The hills adjacent to the new community possess numerous trails including the Wilson Trail; one of Hong Kong's four long-distance walking routes. To increase the accessibility of these trails for residents, the new community has incorporated new footpaths that link to the trails, installing pedestrian signs at appropriate locations to provide a safe and high-quality walking experience. Notably, construction materials used on the footpaths predominantly consist of eco-friendly composite wood and natural stone to maximize the use of environmentally sustainable materials and blend elements into the natural surroundings. From the high points along the hills, hikers can enjoy the views of the Victoria Harbour.

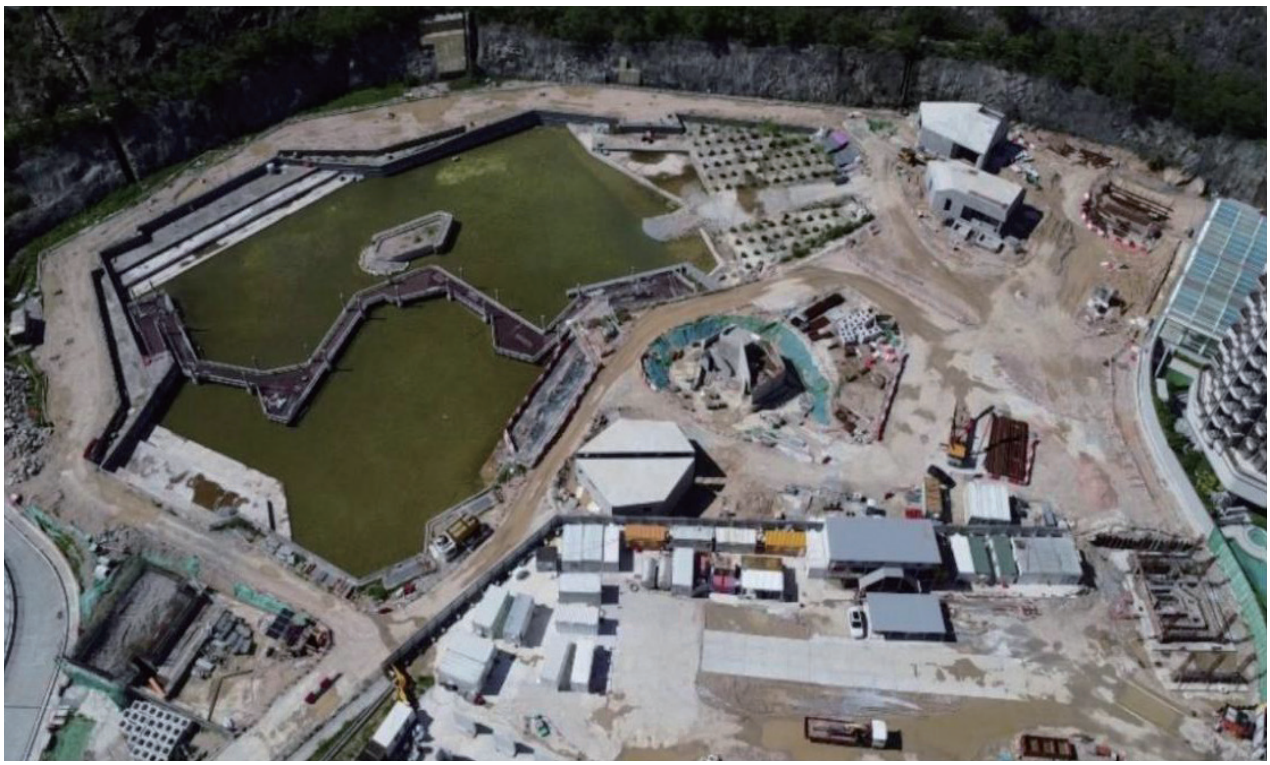
2. Blue-green infrastructure design

Via the incorporation of contemporary design ideas, the HKSAR Government has maximized the use of finite land resources in line with the 'single site, multiple use' model. The new design enhances the functionality of local green spaces, integrating climate-resilient urban infrastructure including an artificial stormwater storage lake, an underground

stormwater storage tank, and porous pavements and bioswales. Critically, such blue-green infrastructure design affords new infrastructure with the capacity to perform in-situ stormwater diversion and dispersion, in which stormwater is collected via infiltration and channel runoff which will be utilized when required to reduce the burden on the traditional downstream drainage systems and therefore, reducing flood risk. The infrastructure enhances the functionality of the local urban ecosystem, increasing climate adaptation capacity and urban greening, and spare roads with heavy traffic in adjoining districts from large-scale drainage improvement projects.

(1) Artificial stormwater storage lake park

The new community is located on the hillside of Kowloon at an elevation of approximately 200m above sea level. During periods of heavy precipitation, surface runoff from the hills is collected via the drainage system in the new community, and subsequently discharged into the Victoria Harbour across existing downstream drainage and rivers. The stormwater storage lake park is a novel component in Hong Kong and will become a landmark and a recreational facility within the new community. With a stormwater storage capacity of approximately 24,000 cubic meters, the lake can reduce the peak flood flow from 7.4 to 1.7 cubic meters per second, significantly relieving the pressure on downstream drainage facilities and river channels. Stormwater collected in the lake can then be discharged in a controlled manner, with the capacity to retain storage and water vegetation and plants, and hence reduce total water consumption. In addition, the lake has the ability to mitigate the urban heat island effect in adjacent areas due to the size of its surface area, thus dampening the impact of localized periods of extreme heat. The surroundings of the lake feature gentle slopes, lawns and landscaping installations for recreational, sightseeing and water-friendly activities, while a floating bridge provides residents with valuable viewing space. Furthermore, real-time monitoring that adopts innovative smart technology enables the live tracking of weather conditions and water levels, whereby visitors will be notified of an orderly exit from the park in advance of heavy rainfall events to ensure their safety (Figure 6.5).



Source: Provided by Civil Engineering and Development Department, the Government of the Hong Kong Special Administrative Region

Figure 6.5 The artificial stormwater storage lake under construction

(2) Underground stormwater storage tank
In addition to the stormwater storage lake, the new community also features an underground stormwater storage tank in the south with similar functionality to reduce flood risk in neighboring communities downstream. In the rainy season between March and October, the underground stormwater storage tank accommodating a storage capacity of up to 10,000 cubic meters, will collect and temporarily store the surface runoff of nearby rock slopes. Supported by an intelligent technology-driven design, the tank has access to real-time rainfall forecasts from the Hong Kong Observatory and can activate its automatically controlled sluices so as to ensure the timely discharge of collected stormwater downstream and free up storage capacity in advance of heavy rainfall. During the dry season from November to February, the underground storage tank can store up to 20,000 cubic meters of stormwater to a depth of approximately two meters, ensuring a reliable water supply to downstream rivers and ecology. Furthermore, there are various recreational facilities including two multi-purpose outdoor basketball and volleyball courts, two five-a-side football and handball fields, refreshment kiosks and other installations on top of the underground water storage tank for use by residents.

(3) Bioswales and permeable paving
Since urban surface runoff is often contaminated with pollutants, the new community has installed two bioswales with functions similar to that of an underground drainage system. The bioswales facilitate the filtration of coarse and medium-sized particles, pollutants and nutrients in stormwater. Notably, one is situated by a pedestrian walkway on a vehicular road and is designed to collect runoff nearby with a catchment area of around 4,000 square meters. The filtered stormwater is then discharged into natural water channels downstream. The another bioswale is located near the Quarry Park in the south, with a catchment area of approximately 12 hectares, which channels filtered stormwater to the artificial stormwater storage lake for retention. Most of the pedestrian walkways along major public roads in the new community are constructed from permeable paving materials to enhance stormwater infiltration, leading to enhanced groundwater recharge and reduced accumulation of surface runoff, while also decreasing the severity of heat island effect.

(4) Low-carbon pedestrian connections
The new community has four core pedestrian connections, see Figure 6.6, augmented by covered escalators and/or footbridges linked to lift towers and stairs that are designed for safe, convenient and barrier-free accessibility to encourage residents to access the various facilities of the new community by walking and thereby reducing their reliance on local transportation. Furthermore, by linking the new community to five nearby existing housing estates which are inhabited by around 100,000 residents, the pedestrian connections extend a wider reach to the neighboring areas, bus-to-bus interchanges and 40 existing or planned community facilities which have significantly improved accessibility both within and outside the new community.

Reference experiences

1. Facilitate active stakeholder engagement to ensure youth well-being and inclusive community development
Throughout the planning and construction processes for the development of the new community, the project team encouraged local stakeholders and young people to engage and provide feedback to improve their sense of belonging and well-being, and to promote collaboration with regard to building a green, carbon-neutral and climate-resilient neighborhood. During the construction phase, in addition to coordinating the progress of various works, the project team explained the different stages of the process to stakeholders and young people via community liaison groups and site visits in order to exchange opinions and share relevant information, see Figure 6.7. Through these proactive communication sessions, the team received over 20 commendation letters and more than 40 engineering awards related to safety and environmental protection.

2. Adopt a people-oriented approach through community inclusive facilities
The pedestrian connections have enhanced linkages and enabled accessibility between the new community and neighboring districts. During the initial period when the escalators are open to public use, blind people in

Source: Provided by Civil Engineering and Development Department, the Government of the Hong Kong Special Administrative Region

Figure 6.6 Diagram of the development of the Anderson Road Quarry Site indicating pedestrian connections in the new community

Source: Provided by Civil Engineering and Development Department, the Government of the Hong Kong Special Administrative Region

Figure 6.7 Professional organizations visit the construction site

the new community were invited by the project team to undertake testing. The team was then able to more accurately and appropriately adjust the volume and direction of audible signal for ascending and descending on the escalators, helping those individuals in need to precisely locate the position of relevant escalators. With the pedestrian connections officially put into operation, blind individuals are now able to extend their reach to different areas of the communities; an opportunity that was not feasible for over 20 years, thus increasing their own independence. These actions demonstrate the commitment of the team in supporting disadvantaged groups and adopting a people-oriented approach to community development.

Xuhui District, Shanghai, China The practice of Leshan pocket park: a collaborative and participatory approach adopted by Xuhui District[1]

Case background

Known for its vibrant economy, large population, and high-quality ecological and livable environment, Shanghai is China's international economic, financial, trade, shipping and technological centre, covering a total area of 6,340.5 km^2 with a permanent population of nearly 25 million. Xuhui District is a central area in Shanghai. The district covers about 54.93 km^2 and has a permanent population of around 1.1 million, with a population density exceeding 20,000 people per km^2. The population is approximately five times the average density of Shanghai, and three times that of Hong Kong and New York. This high-density urban environment faces tremendous pressure from regional climate change, making the construction of public spaces an important part of urban greening and ecological development. The public spaces play a crucial role in improving the urban ecological environment and enhancing the city's climate resilience. Park construction not only increases a city's overall urban green space but also effectively mitigates the urban heat island effect, improves air quality and provides citizens with a better living and working environment. City managers face a major challenge: how Xuhui District, a densely populated central district in a megacity, can provide more public green spaces and high-quality public services to residents and promote sustainable development and refined governance[2]?

To better address regional climate change and meet the urgent demand for urban green spaces, Shanghai plans to build 300 pocket parks (i.e., parks at intersections) during the 14th Five-Year Plan (2021—2025). In 2022 and 2023, the construction and renovation of 60 pocket parks was included in Practical Projects for the People by the Shanghai Municipal Party Committee and Municipal Government. Pocket park construction has become a key initiative to enhance urban climate resilience across the city and even nationwide. Considering local conditions, Xuhui District, supported by this policy, has focused on developing small green spaces in close proximity to its residents. The district has created a number of community parks, pocket parks and small urban parks through renovating old green spaces, opening up green spaces attached to building units, converting spaces where illegal structures have been demolished into green areas, and creating green spaces under bridges and other urban gray spaces. Over the past five years, Xuhui District has rebuilt and constructed nearly 30 pocket parks including Leshan Greenbelt, Wuxing Garden, Rihui Greenbelt, Tangjiao Garden and the Shanghai Conservatory of Music Greenbelt. By the end of the 14th Five-Year Plan, Xuhui District aims to be a "District of a Hundred Parks". Leshan Park is a model example of returning green space and scenic spots to the public, offering high-quality services and practicing refined governance, see Figure 6.8.

1 This case study was supported by the Landscaping & City Appearance Administrative Bureau, and the Construction and Management Committee of Xuhui District, Shanghai. The primary author is Dr. Chen Haiyun from the Institute of Sustainable Development and Management, Tongji University. Contributing authors include experts from the following institutions: Tongji University, Shanghai Municipal Engineering Design and Research Institute (SMEDI), Shanghai Jiao Tong University, and Shanghai University.

2 Refined governance refers to the approach of enhancing the accuracy and precision of urban management through the detailed refinement of objectives, measures, management and evaluation in urban governance.

Source: Xuhui District Landscaping & City Appearance Administrative Bureau and Housing and Urban-Rural Development Bureau

Figure 6.8 A corner of Leshan Park

Implementation process

The Leshan Greenbelt was initially established in the 1980s, located in the centre of the Leshan community in Xuhui District, covering about 5,600 m^2. It is the only public open space in the area. Before its renovation, the interior space of the greenbelt was dark – the plants were largely degraded, noise disturbed residents, facilities were outdated and its function did not meet the recreational needs of modern citizens. Additionally, the long-term management system of walled enclosed areas led to many residents needing to bring their own chairs outside to sit in narrow and scattered street spaces. In 2021, Xuhui District, in conjunction with the comprehensive management project of the Leshan area, started improving the landscaping and functionality of the Leshan Greenbelt, see Figure 6.9.

Xuhui District focused on the following aspects:

1. Conducting participatory design with a "people-centred" approach through site visits and research to gather public opinions and needs

During the design phase, the Landscaping & City Appearance Administrative Bureau collected feedback through opinion surveys and on-site research with residents and visitors in the area. This process resulted in the formation of a "positive list" and a "negative list" for the renovation of the greenbelt. The positive list included detailed specifications for eco-friendly and all-age-friendly facilities and services, while the negative list clearly defined excessive commercial activities and “flashy" but impractical construction. After the preliminary plan was completed, design units, local officials and resident representatives were invited to participate in discussions to optimize the plan, addressing issues such as noise disturbance, obstruction from large trees, narrow pavements and lack of seating. During the construction of the pocket park, suggestion boxes and WeChat groups were set up to maintain communication with residents, many of whom voluntarily participated in the design and construction, achieving true co-creation of the park and increasing public engagement and satisfaction.

2. Harnessing the power of youth: empowering young people as innovators, organizers and advocates

In the construction and management of pocket parks, young people born after 1985 make up 85 percent,

Source: Xuhui District Landscaping & City Appearance Administrative Bureau and Housing and Urban-Rural Development Bureau

Figure 6.9 The "corridor of joy" at Leshan Park

and those born after 1995 make up 50 percent of all participants. These young people primarily play three key roles. Firstly, as innovators, their curiosity and exploratory spirits contribute many creative ideas for the design and construction. Secondly, as activity organizers, they inject vitality and charm into the pocket parks and their neighbourhoods by organizing various activities such as nature education, gardening classes, community building and participatory design. And thirdly, as green advocates, they focus on environmental protection and ecological balance, participating in the management and maintenance, thereby improving the ongoing service quality of the parks and surrounding buildings.

3. Practicing the Dual Carbon concept: focusing on ecological leadership to build multi-dimensional green and low-carbon public spaces

To practice the "Dual Carbon" concept[1], Xuhui District continuously advances the green and low-carbon transformation of pocket park construction, shifting the focus from single landscape creation to green and low-carbon development. On the one hand, the district emphasizes the guiding role of green ecological principles. As an integral part of the "beautiful blocks" initiative, pocket parks are designed and built with respect for the natural environment, highlighting green development and ecological restoration. On the other hand, the district emphasizes the key role of ecological

1 "Dual Carbon" refers to carbon peaking and carbon neutrality. In September 2020, China proposed the goals of carbon peaking by 2030 and carbon neutrality by 2060.

functions, particularly the application of the sponge city concept. The district has extensively used permeable paving materials and installed rain gardens and water collection devices to reduce, delay, purify and store rainwater, promoting the recycling and reuse of water resources. Through green and low-carbon ecological creation and a series of science popularization activities, the concepts of the Dual Carbon strategy, biodiversity protection and green low-carbon living have been widely disseminated, further reinforcing the low-carbon and natural ecological essence of green public spaces.

4. Meeting residents' practical needs through continuous refinement of details

The project renovation was rooted in the daily needs of Leshan community residents with careful attention paid to design details. Most of the users of Leshan pocket park are senior citizens. Before the renovation, the greenbelt was crowded and lacked seating, forcing them to bring their own small stools and to sit in the sun by the roadside, which obstructed traffic and posed safety risks. In response to this, the greenery department conducted a full-time sunlight analysis and designed seating areas in the park that allow residents to be warm in the winter and keep cool during the summer, see Figure 6.10. Seating was also added near the side of the park close to a neighbouring kindergarten using white concrete, which absorbs and transfers heat slowly. The seating was designed in varying heights to meet the needs of different age groups and heights. In some areas, wooden panels and backrests were added, providing a less functional touch.

Reference experiences

1. A people-centred approach and highly inclusive participation are key strategies for pocket park construction and management

In the construction of green spaces, such as pocket parks, Xuhui District actively encourages and invites

Source: Xuhui District Landscaping & City Appearance Administrative Bureau and Housing and Urban-Rural Development Bureau

Figure 6.10 Rihui Park

residents to participate, fully integrating public opinions into the entire process of pocket park construction. This has led to the development of a relatively mature participatory practice pathway consisting of several stages: (1) Pre-design stage: announcement of renovation information and collection of public opinions; (2) Design stage: distribution of opinion survey forms, on-site research and holding of discussion meetings to gather suggestions and optimize the design plan accordingly; (3) Construction stage: installation of suggestion boxes and opening of WeChat work groups to regularly update residents on progress, facilitating public supervision and feedback; (4) Maintenance stage: formulation of green space self-governance agreements for residents.

Leshan Greenbelt is the first of Shanghai's pocket parks that had full public participation throughout its construction. After nearly three years of use, it has become one of the most visited parks in Shanghai, achieving the renovation goals of revitalizing urban ecological vitality and serving the community's desire for a better life.

2. Youth leadership and ecological coexistence: infusing pocket parks with youthful energy

Youth have played a crucial role in the construction and management of green spaces like pocket parks. From design and planning to construction and management, young people have used their wisdom and actions to advance pocket park development. They have combined modern aesthetics with natural landscapes, designing pocket parks that are both current and rich in natural charm. This approach not only enhances the overall beauty of green spaces but also meets residents' aspirations for a better life, making the areas more vibrant and full of youthful energy. Additionally, ecological coexistence has become a key concept throughout the pocket park construction and management process. Younger residents are undoubtedly the driving force behind this process, injecting fresh energy and limitless possibilities into the construction and management of pocket parks through their unique perspectives, innovative thinking and active engagement.

3. Mechanism innovations under co-construction, sharing and co-governance are valuable experiences for refined governance

The areas of co-construction, sharing and co-governance, as well as in refined governance, have been explored during the construction and management of pocket parks. In terms of co-construction mechanism innovation, multi-party participation and public opinion gathering allows different groups to contribute ideas and widely gather the practical needs of the public. Additionally, platform building and communication coordination are facilitated through a coordination committee composed of representatives from relevant departments which regularly meets to discuss and resolve issues that arise in the construction of pocket parks. With regard to sharing mechanism innovation, balanced layout and services for all citizens is achieved by optimizing and balancing the urban green space layout, creating small but exquisite pocket parks that offer a variety of recreational spaces for citizens. Facilities are also improved and functions are diversified by installing accessibility features and age-friendly facilities in line with the needs of senior citizens and children, ensuring that people of all ages can enjoy the benefits provided by pocket parks. Multi-party collaboration and coordinated management through the joint efforts of local communities, sub-districts, towns and the relevant functional departments improve the daily maintenance and management of green spaces. Beyond this improvement, the establishment of a supervision mechanism ensures quality. Dedicated supervisory bodies or citizen-organized supervisory groups are set up to regularly evaluate the management of pocket parks and provide improvement suggestions to relevant departments.

Bandung, Indonesia
The Youth Advocacy for Climate Action programme

To strengthen the influence of young people in climate action, the Foundation of Inspiration for Indonesia Development, the IBU Foundation and U-Report, with the support of Insight Investments Management Company, established the Youth Advocacy for Climate Action (Y4CA) programme in the city of Bandung. Aiming to empower local youth aged 15 ~ 24 in the city, the event promoted the concept of co-creation to support 10 youth-led organizations engaged in socioenvironmental action. Held from 23 ~ 25 February 2024, it incorporated a variety of dynamic climate focused activities, benefitting 35 participants who undertook advocacy training across the 3 days, see Figure 6.11.

Using a range of training materials adopted from the UNICEF Youth Advocacy Guise module, topics included an introduction to climate change and its impact on youth, an introduction to advocacy, the difference between meaningful participation and tokenism, maintaining mental health as an advocate stakeholder and credibility in preparing advocacy plans. Participants were invited to generate concrete action plans able to be implemented at the local level on a global scale, consisting of aspects such as problem identification, goal setting and advocacy strategy design. The programme also provided children and youth with the opportunity to actively engage in the process of applying the concepts they had learnt. Funding support was offered for those action plans designed by participants in an effort to help actualize ideas and advocacy efforts development during the training. Recognizing funding as a vital aspect to effectively implement activities, financial support could be used to conduct local workshops, social campaigns and climate focused projects. Through the transfer of key knowledge and skills, the programme therefore helped to empower and encourage young people to play dynamic roles as agents of change in efforts to combat climate change.

Source: http://www.english.yiim.or.id/training-the-youth-to-advocate-for-change-and-anticipate-the-climate-crisis/

Figure 6.11 Participants of the Y4CA programme

Policy suggestions

1. Urban infrastructure development should follow the laws of nature to better address climate change and build sustainable, resilient cities

In the context of today's global climate change, cities – as major centres of human activity – have infrastructure development that not only impacts residents' quality of life but also directly affects the city's capacity to adapt to climate change and achieve sustainable urban development. Integrating natural ecological principles into urban infrastructure development and focusing on building resilient cities has therefore become a key direction for urban planning and development. It is necessary to move away from a narrow engineering mindset and embrace ecological concepts. Traditional grey urban infrastructure construction has often prioritized fast and efficient engineering solutions, but this approach frequently overlooks the harmonious coexistence with the natural environment. To achieve sustainable development, we must change our way of thinking and place laws of nature at the core, adopting nature-based solutions that integrate eco-friendly technologies, minimize environmental impact, and promote the restoration and protection of natural ecosystems.

Constructing resilient cities to combat climate change is therefore an urgent priority. On the one hand, forward-thinking and predictive planning is needed. The increasing frequency of extreme weather events due to climate change poses significant challenges to the normal functioning of cities. Consequently, building resilient cities becomes an inevitable choice for climate adaptation. Urban planners and policymakers need to develop a forward-looking mindset, anticipating future risks and challenges, and proactively creating predictive plans. On the other hand, urban resilience must be enhanced across multiple dimensions. Firstly, the redundancy and flexibility of urban infrastructure should be strengthened to ensure a rapid recovery of operations following disasters. And secondly, the capacity for disaster warning and emergency response should be improved by establishing comprehensive disaster management systems. Social capital accumulation and social network building should be enhanced to improve the self-help and mutual aid capabilities of urban residents. Promoting green buildings and low-carbon transportation is also crucial for enhancing urban resilience.

2. Efficient use of limited urban land resources requires systematic planning and multi-use design

With the accelerating pace of urbanization, urban land resources are becoming increasingly scarce, making the efficient use of these limited resources a key issue in urban planning and development. In this context, systematic planning and multi-use design are particularly important. They serve not only as a critical means to improve land-use efficiency but also as vital tools for building ecologically resilient communities and promoting sustainable urban development. The multi-use land development model shown in the Hong Kong case study not only improves the efficiency of land resource utilization but also promotes the diversification and ecological integration of community functions. Through rational planning and design, land that was originally designated for a single use can be transformed into comprehensive areas that integrate residential, commercial, recreational and ecological functions so as to meet the diverse needs of urban residents and enhance the overall quality of a city. Ecological community construction requires systematic planning and design. The construction of an ecological community is a complex and systematic process that requires consideration of multiple factors, including the natural environment and socioeconomic impacts. Systematic planning is the foundation for ensuring the orderly progress of ecological community construction and the coordinated development of various functions. By formulating scientifically sound planning schemes, key elements such as development goals and spatial layout can be clearly defined, providing strong guidance for subsequent construction and management. In the design process of ecological communities, the principles of ecological priority and people-centredness should be emphasized. It is essential to make full use of natural resources and environmental conditions by incorporating ecological elements such as greenery, water systems and landscapes to create a livable and sustainable environment. And it is equally important to carefully consider residents' needs and habits, optimizing spatial layout and facility provision

to enhance their quality of life and sense of well-being.

3. The development of urban public green spaces should be people-centred and based on the primary needs of community residents

Urban public green spaces, as a crucial component of residents' lives, are increasingly receiving attention in their development and management. These spaces not only serve as the ecological lungs of the city but also provide important areas for residents to relax, socialize and engage in recreational activities. The Xuhui, Shanghai case study upholds a people-centred approach, focusing on meeting the primary needs of community residents while emphasizing the multifunctionality of these spaces as composite public service platforms. The creation of urban public spaces should involve resident participation throughout the entire process. During the design phase, it is essential to widely solicit opinions and suggestions from community residents to understand their actual needs and usage habits. In the construction phase, resident supervision groups can be established to oversee progress, material usage and construction quality, ensuring that the process aligns with the design requirements and minimizes disruptions to residents' lives. Similarly, in the management phase, resident involvement is crucial. By establishing feedback mechanisms, residents can provide input on the usage and management of green spaces to allow for timely adjustments to strategies and improvements in service quality. Urban public spaces, such as pocket parks, should function as multifunctional composite public service platforms. As a significant form of urban public green spaces, pocket parks should go beyond mere aesthetic value in their design and strive to be the carrier of multifunctional public services. In addition to providing greenery and beautifying the environment, they can incorporate seating, fitness equipment, children's play areas and other amenities to meet the needs of various residents. Pocket parks can also serve as venues for community cultural activities, such as concerts, art exhibitions and gatherings, thereby enhancing community cohesion and cultural atmosphere. Only in this way can the value of green spaces be fully realized, creating more livable, work-friendly and tourist-friendly environments.

4. Responsive policies should be implemented to encourage sustained youth participation in climate action and resilient city building

Youth should be encouraged to participate in policies and strategies for addressing climate change and building resilient cities. In the face of global climate change and the construction of resilient cities, the power of youth is indispensable. They are not only the future leaders but also critical participants in current actions. To more effectively mobilize youth to continue engaging in these important issues, a series of responsive policies should be implemented to enhance their sense of involvement, achievement and pride, while also inspiring their energy and enthusiasm to attract more participants to these efforts. The involvement of youth can influence and motivate broader participation. To fully leverage the role of youth in sustainable urban development, we need to adopt a series of measures to inspire them. Firstly, a robust youth participation mechanism should be established to provide opportunities and platforms for them to engage in urban governance and environmental actions. This can be achieved through youth volunteer organizations which allow them to learn and grow through practical experience. Secondly, education and publicity should be strengthened to increase their awareness and responsibility towards sustainable urban development. This can be done through school education, social campaigns and other channels to disseminate relevant knowledge and guide youth in forming the right values and actions. And thirdly, attention should be given to the growth and development needs of youth so as to provide them with support and assistance. This includes offering employment and entrepreneurial opportunities, and optimizing the environment for their development, allowing youth to make meaningful contributions while realizing their personal value.

This chapter was jointly written by Tongji University, UN-Habitat, and the Development Bureau of the Government of the Hong Kong Special Administrative Region of the People's Republic of China (DEVB). The Liverpool case study and the Indonesia boxout were written by UN-Habitat. The Hong Kong case study was contributed by DEVB. The Shanghai case study was co-authored by a team led by Dr. Chen Haiyun from Tongji University.

Chapter 7

Culture: Youth-driven low-carbon culture and environmental innovation

Introduction[1]

Global climate change and the environmental issues it brings have become significant challenges to human survival and development today. However, current climate research and actions often focus on scientific data, technological solutions and economic interests, while cultural remedies that could fundamentally alter human behaviour and lifestyles receive less attention. Addressing the global climate crisis urgently requires filling in this cultural gap. Culture is a shaper of low-carbon values and acts as a transformational catalyst that determines the direction of individual and collective climate actions. It serves as a bridge between global climate visions and localized solutions, playing a crucial role in coordination and integration. Culture also acts as an accelerator for climate action, efficiently transmitting low-carbon awareness to a broader audience through its diverse communication channels, thereby fostering and consolidating overall societal low-carbon behaviour. Placing culture at the heart of climate policy is a key investment for city leaders to accelerate sustainable urban futures. Although many cities continue to adhere to traditional approaches, low-carbon culture, which envisions harmony between humanity and nature, and is manifested in green and low-carbon lifestyles, is increasingly recognized, accepted and practiced. It advocates for the elimination of carbon dioxide emissions, the minimization of natural resources consumption and the active mitigation of pollution across the natural environment. As a form of expression of sustainable development principles and a catalyst for green economic and social development, it can provide intrinsic motivation to encourage urban residents to adopt environmentally friendly lifestyles and thereby leverage the benefits of green industries.

As future world leaders and agents of change, the actions of young people are crucial in addressing climate change. Youth are an important group for achieving the goals of "carbon peaking and carbon neutrality" and are significant contributors and practitioners in promoting sustainable development, and comprehensive green economic and social development transformations. Culture plays a vital role in shaping young people's green and low-carbon values and in awakening their sense of identity and responsibility towards adopting green lifestyles. Firstly, culture subtly and profoundly influences younger generations by internalizing ecological wisdom and low-carbon concepts into their cognitive and value systems, forming an inherent drive for environmental protection and the sustainable use of resources. Secondly, culture, through diverse forms of expression and communication media such as art, music, theatre and literature, stimulates youth creativity and innovation encouraging them to interpret and spread environmental ideas in novel and concrete ways. And thirdly, the diversity and inclusiveness of culture provides young people with broad space to explore and practice low-carbon concepts in a multicultural context. Through cross-cultural dialogue and cooperation, localized low-carbon solutions that meet the needs of different cities and communities are constructed, allowing global climate visions to be effectively realized at the local level.

As a group with first-hand insight into the climate crisis, youth are more inclined to perceive and embrace the essence of green and low-carbon culture in their interactions with nature. By harnessing their unique creativity, climate-conscious youth adopt non-exploitative work and creative methods towards the environment, transforming the concepts and visions of ecologically oriented urban societies into localized, eco-friendly cultural products. They adopt sustainable practices in the design industry, for example, integrating ecological concepts into artistic works and actively promoting digital transformation in the cultural sector. This expansion and externalization of ecological cultural values creates new urban living scenarios that are visible, tangible and participatory. Youth, as a key generation receiving innovative education related to climate action, play dual roles as both inheritors and innovators of low-carbon culture. They are not only the recipients of traditional ecological wisdom and local knowledge but also

1 Authors of this chapter are: Sheng Yang, Shi Wen, Ouyang Chen, and Tang Yingying from the Shanghai Library (Institute of Scientific and Technical Information of Shanghai); and UN-Habitat. The Harandri case study and the Singapore case study were written by UN-Habitat.

creators of ecological cultural strategies and climate action models that meet contemporary needs by combining traditional wisdom with modern technology through critical thinking and innovation. As the most dynamic and creative group in society, youth are more capable of integrating low-carbon culture with digital media and other modern communication methods. They create works such as music, films, animations and games that appeal to all age groups, and use these mediums to promote green and sustainable lifestyles. This, in turn, raises public awareness of climate issues, fosters recognition of the urgency and necessity of climate action, and encourages both the public and policymakers to participate in making change. As a backbone in climate negotiations, youth actively voice their opinions on climate change and green development, promoting urban decision makers to incorporate green and low-carbon cultural concepts into urban governance policy frameworks through participation in public policy discussions, community planning and climate conferences. This bottom-up participation approach makes climate policies more aligned with actual needs, more feasible and more sustainable.

The active participation and innovative practices of youth lay a solid foundation for driving inclusive and sustainable urban development. Policymakers and all sectors of society should further support and encourage youth-led low-carbon cultural innovation activities, integrating low-carbon cultural concepts and climate actions advocated by youth into urban policies and plans. This will help to instil a perpetual concern and reflection on climate issues in future generations, advancing collective efforts to address global climate change challenges and drive climate-resilient and sustainable urban development.

The chapter explores how youth are championing a low-carbon culture and embracing green living practices with three case studies and two boxouts. The Amsterdam case showcases the Fashion for Good Initiative's approach to engaging young people in sustainable fashion through interactive museum experiences and educational programs. The Harandri case study integrates the restoration of historical heritage with modern infrastructure to revitalize the water management system and boost urban resilience around the Hadrian's Waterway. This approach fortifies the community's water resource management and cultural identity by engaging youth and fostering collaboration across different sectors. The Chengdu case study illustrates the successful blend of ecology and culture in the Luxelakes Park Community through youth-led initiatives and collaborative efforts of various stakeholders. The first boxout covers the Future Yetu project in Korogocho, Kenya, which enhanced community awareness of climate action through digital narratives. The second boxout focuses on the Youth4Climate festival in Singapore, a vibrant event that cultivates a green culture through art and encourages youth participation in sustainable development.

Case studies

Amsterdam, the Kingdom of the Netherlands
Fashion for Good initiative

Case background

In recent years, with ongoing economic development and the diversification of consumer demands, the fashion industry has gained increasing prominence in the consumer goods sector, becoming one of the largest and most internationalized industries globally. However, in the pursuit of fast fashion, the industry's linear business model of "take-make-waste" has led to significant energy consumption, resource wastage, environmental pollution and carbon emissions. The fashion industry has become one of the major culprits harming the planet's health and human well-being. Green transformation has thus become an imperative for the entire industry. Against this backdrop, the non-profit organization "Fashion for Good" emerged. Founded by a group of idealistic young people, the organization aims to inspire those new to the field and empower potential innovators within the industry by widely disseminating and continuously sharing

cutting-edge ideas and valuable experience related to "sustainable fashion". Together, they aim to steer the fashion industry toward a green, low-carbon and environmentally friendly future.

In 2017, the organization established the world's first museum dedicated to sustainable fashion – the Fashion for Good Museum – in a century-old building in central Amsterdam, see Figure 7.1. From its inaugural temporary exhibition in April 2017 to the creation of the first interactive space in October 2018 and its official recognition as a museum in 2020, the Fashion for Good Museum consistently blended foresight and creativity. It combined permanent installations, temporary exhibitions, educational initiatives, practical toolkits and research reports, enhanced by immersive interactive experiences. This approach sparked widespread social resonance and positive feedback, continuously expanding its influence. At the same time, the project organizers created the "Fashion for Good Innovation Platform" in order to gather pioneering innovators in the fashion world, accelerating the scaling of disruptive solutions and injecting strong momentum into the green and low-carbon transformation of the fashion industry. Although the museum closed in June 2024, its mission remains ongoing. The focus has now shifted to expanding and deepening the innovation ecosystem with a more strategic outlook so as to continue leading and accelerating the global practice and popularization of sustainable fashion.

Source: Fashion for Good (2024). Fashion for Good Museum 2017—2024 Legacy Report

Figure 7.1 Fashion for Good Museum

Implementation process

1. Deep interaction, cross-field co-creation and popularization of new green fashion ideologies

(1) Embarking on good fashion actions through an interactive journey. The interactive exhibitions at the Fashion for Good Museum cleverly integrated cutting-edge technology to create a deeply engaging multidimensional experience for visitors. Upon entering the museum, visitors were given RFID-enabled wristbands, as shown in Figure 7.2, to begin a personalized exploration. From designing their own T-shirts to pledging not to buy new clothes for 30 days and committing to climate action, each interaction was recorded and compiled into a personalized "Good Fashion Action Plan" and emailed to them at the end of their digital journey so as to encourage deeper reflection on the current climate crisis. This interactive experience not only prompted visitors to reconsider their consumption habits and inspire their commitment to sustainable fashion, but also served as a bridge connecting them to the museum's digital community

Source: Available at: https://www.localprojects.com/work/corporate-experience/the-fashion-for-good-experience/

Figure 7.2 Interactive wristband at the Fashion for Good Museum

to share climate news and promote collective climate action. Subsequent surveys have shown that 98 percent of participants exhibited positive behavioural changes toward low-carbon practices, highlighting the project's profound impact.

(2) Gaining insights into the entire ecological chain of the clothing industry through drawing. In terms of exhibition design, the museum also aimed to engage visitors through multiple senses. By touching cotton and fabric, visitors could gain a deep insight into the environmental footprint behind the fashion industry. The specially designed T-shirt design studio, with projections as the backdrop and touch tablets as pens, allowed visitors to draw creative patterns on digital T-shirts, see Figure 7.3. They could then choose to archive their designs or purchase a physical T-shirt made from biodegradable materials, experiencing first-hand the fun of design and taking responsibility for environmental protection.

Source: Available at: https://www.localprojects.com/work/corporate-experience/the-fashion-for-good-experience/

Figure 7.3 Projection-equipped T-shirt design studio

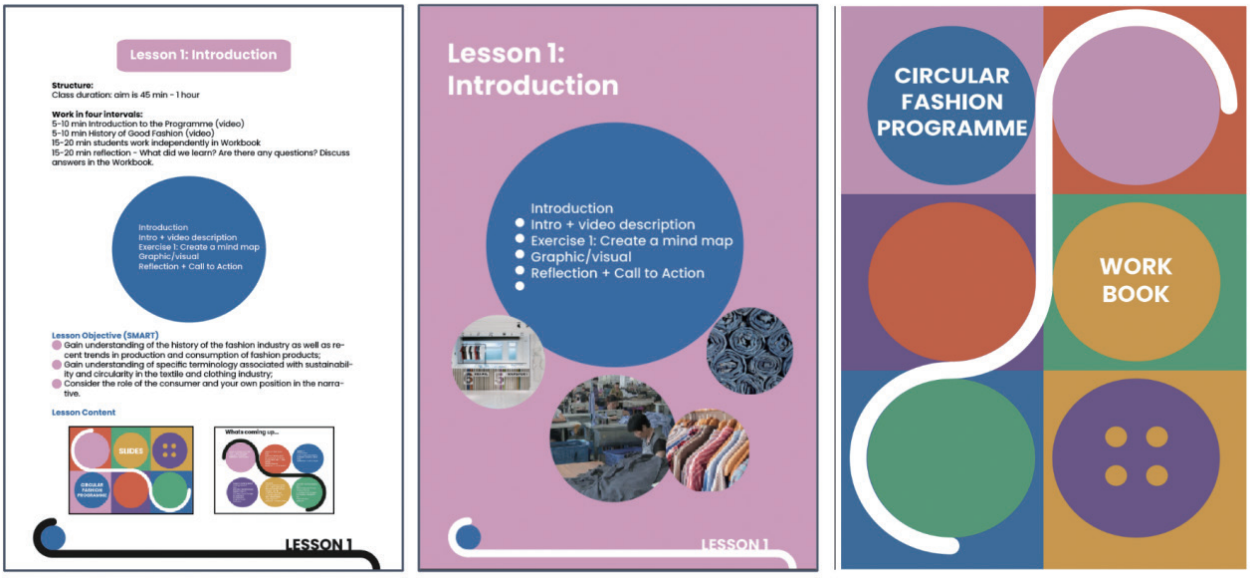
(3) Cross-industry collaboration for co-creating multi-dimensional narratives of sustainable fashion. Over the course of seven years of operation, the museum attracted over 115,000 visitors[1]. It not only maintained a presence through permanent exhibitions but also organized 13 temporary exhibitions, collaborating with young designers and interdisciplinary experts to weave colourful narratives of sustainable fashion. Among them, the "Knowing Cotton Otherwise" exhibition was particularly noteworthy. Crossing boundaries of art, design and science, it created an interactive space to explore the close relationship between cotton and fashion. The exhibition's three chapters – the connection between cotton and the fashion industry, cotton's role in the global cultural network and innovative means of cotton recycling – were co-created by pioneers from various fields. The stories and insights collected through the exhibition have been compiled into a book to further inform and inspire.

1 Fashion for Good (2024). Fashion for Good Museum 2017—2024 Legacy Report.

2. Co-nurturing a new generation practicing low-carbon fashion through multi-tiered education and multi-channel promotion

The museum initially targeted women aged 18 ~ 35 with a certain level of fashion knowledge who also embraced green and low-carbon concepts as its core audience. However, the organizational team soon realized that to truly bring about profound changes in consumer behaviour in the fashion industry, they needed to reach and influence a broader audience in a multidimensional and multi-level manner – especially those unfamiliar with low-carbon concepts and climate actions. Therefore, the team shifted its educational focus to two key groups: the next generation of fashion consumers who are the driving force of the future market; and professionals in the fashion industry who lead industry trends and standards. To achieve this goal, the team carefully crafted a gradient cultural communication strategy. This strategy not only included customized educational content tailored to different age groups, knowledge backgrounds and interest preferences, but also fully utilized modern technology and digital platforms to vividly and intuitively showcase the charm and value of sustainable fashion.

The museum introduced the "Knowledge Classroom Around You" inviting people of all ages to step into this learning space with the aim of promoting the green transformation of consumption behaviours within the community and leading the public towards more environmentally friendly clothing consumption patterns. The strategy was divided into four levels: enlightening the unaware (inspiring sustainable fashion awareness and actions); nurturing the interested (deepening the understanding of low-carbon clothing production and consumption through rich educational experiences, particularly targeting youth projects); deepening the core group (creating an in-depth communication platform for fashion enthusiasts, professionals and influencers with existing awareness); and empowering practitioners (weaving a network of fashion activities to inspire environmentally friendly fashion innovation practices). The museum proactively focused on the cultivation of future designers and professionals in the fashion industry by tailoring a series of courses for the Dutch fashion education system. These courses spanned from basic education to higher education, such as "Journey of a T-shirt" to enlighten elementary school students, "Take Action, Change Fashion" to motivate high school students, "Circular Fashion Programme" to empower vocational education students and "Classroom of the Future: The Stories Behind Cotton" to inspire higher education groups. The museum generously shared its educational toolkit openly on its website, further expanding its educational impact, see Figure 7.4.



Source: Available at: https://fashionforgood.com/our_news/fashion-for-good-museum-launches-educational-toolkit-the-circular-fashion-programme/

Figure 7.4 Circular Fashion Programme Toolkit

Through these graded cultural dissemination strategies and precise educational programme designs, the museum team has successfully ingrained the concept and practice of sustainable fashion into a wider audience, injecting new vitality into the green and low-carbon development of the fashion industry. From 2021 to 2024, the museum attracted 8,000 students from 200 schools[1], with students accounting for over a quarter of all visitors. Its outstanding educational programmes not only won favour from frequently re-visiting schools in the Kingdom of the Netherlands, but also attracted schools from other countries including Belgium, Denmark and Norway, showcasing its leading position in promoting global sustainable fashion education.

3. Gathering offline momentum, expanding online boundaries and jointly building a new community for fashion transformation

In this culturally rich building, the Fashion for Good Museum successfully planned more than 75 events, bringing together over 7,500 visitors[1]. From celebratory exhibition openings and closures to brainstorming roundtable forums, and climate-themed film screenings to book launches, each step inspired participants to think about green and low-carbon production and lifestyles. In addition, the museum organized workshops and clothes swap events, as shown in Figure 7.5, not only promoting communication and connections among like-minded individuals, but also jointly building a vibrant community to drive the trend of climate-positive change in the fashion industry.

Source: Available at: https://amsterdamsmartcity.com/updates/event/clothes-swap-at-fashion-for-good-museum

Figure 7.5 Clothes swap activity

With offline activities at its foundation, the museum cleverly used digital means to build an interactive community ecology online, further expanding its sphere of influence. In terms of self-media operation, it released high-quality textual, visual and audio content on social platforms while also launching virtual exhibitions and online activities, broadening the boundaries of display and reaching a wider audience. In terms of media coverage, the museum issued press releases and exhibition previews for its many and varied events, successfully attracting the attention and coverage of globally renowned media such as *The Wall Street Journal and Forbes*, and achieving broad social exposure. It invited numerous opinion leaders and internet celebrities in the sustainable fashion field to participate in activities, leveraging their social media platforms to further amplify the activities' impact and reach. During its operation, the museum's media influence made a qualitative leap, garnering media exposure equivalent to EUR 46 million, surpassing 250,000 social media followers and reaching 15,000 news subscribers[1], showcasing its outstanding achievements and profound impact on the path to promoting fashion for good.

4. Incubating new forces for climate actions through building innovation platforms and involving the entire industry chain

The Fashion for Good initiative has established an innovation platform, created a green and low-carbon empowering ecosystem and brought together pioneers, brands, retailers, manufacturers and funders dedicated to sustainable innovation. By strengthening capacity building, expert guidance, financing matchmaking and market expansion, this platform not only nurtures a vibrant community to collectively explore and promote low-carbon technologies and environmental concepts but also profoundly influences the climate action path of the fashion industry.

1 Fashion for Good (2024). Fashion for Good Museum 2017–2024 Legacy Report.

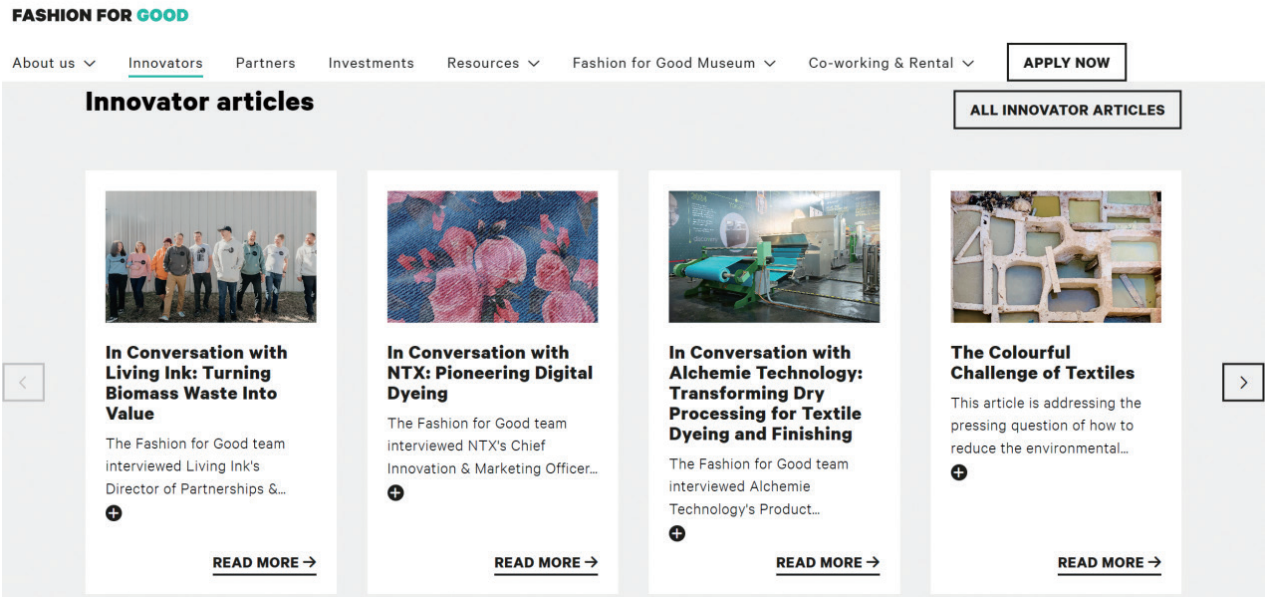
Given the deep impact of the fashion supply chain on the environment and its inherent complexity, the platform chooses to deeply engage in it, focusing on six key and challenging areas: the green procurement of raw materials; low-carbon processing technologies; production process optimization to reduce the carbon footprint; environmentally friendly practices in retail distribution; enhancing consumer experience while strengthening environmental awareness; and ensuring supply chain transparency and full traceability to monitor environmental performance. Through financial support, the platform helps innovators turn climate-friendly solutions from ideas into reality, driving them towards commercialization and leading the fashion industry towards a low-carbon transformation.

A particular highlight of the museum, the "Innovation Gallery", focused on showcasing the stories of innovators who actively addressed the challenges of climate change on the Fashion for Good Innovation Platform, see Figure 7.6. These stories were also widely disseminated on the Platform's official website, inspiring more people to pay attention to and engage in climate and environmentally friendly low-carbon fashion. As of July 2024, the project had brought together over 2,994 environmental innovators; successfully supported 184 leading figures; initiated 570 experimental projects aimed at reducing the carbon footprint; and implemented 423 specific cases with a total investment amount of over EUR 1.9 billion[1], thereby contributing significantly to the fashion industry and global climate governance.

Reference experiences

1. Interactive experience spaces facilitate ecological values in young people

Culture possesses a pervasive and deeply ingrained power that can subtly refine an individual's consciousness, ultimately shaping their behaviour patterns. As active participants in cultural inheritance and change, young people have open minds and agile learning abilities, making them particularly attracted to and inspired by interactive exhibitions. Compared to the passive reception of traditional one-way exhibitions, interactive exhibitions with their unique feedback mechanisms create a participatory stage for



Source: Available at: https://fashionforgood.com/innovators/

Figure 7.6 Articles on innovators displayed on the Fashion for Good official website

1 Available at: https://fashionforgood.com/.

young audiences, greatly stimulating their curiosity about climate issues in the fashion industry. During this process, young people immerse themselves in a rich multi-sensory experience, allowing the concepts of low-carbon culture, green fashion and sustainable development to deeply resonate within them. The exhibition cleverly guides young people to build personalized climate action maps based on their interests and values. This highly customized experience precisely aligns with the diverse lifestyles and values of young people, laying a psychological foundation for their subsequent transition to low-carbon behaviours. After the exhibition, the museum's ongoing information dissemination and feedback collection mechanisms not only create an active interactive ecosystem that helps organizers to accurately assess the exhibition's effectiveness and continuously optimize their strategies, but also deepens young people's understanding of and emotional resonance with sustainability concepts. This ongoing engagement encourages them to move from theoretical understanding to practical action, becoming key players in climate actions and driving societal green and low-carbon development.

2. Tailored educational programmes enhance young people's green action ideals

Cultural institutions should broaden their horizons and go beyond their existing audience circles to actively engage in extensive and in-depth educational practices, particularly focusing on young people who are the backbone of future climate action. In this case, education is not only a key means of driving low-carbon transformation in the fashion industry but also its essence. It requires implementing precise educational strategies for audiences with different backgrounds and needs, ensuring the effective transmission and deep impact of knowledge and concepts. When planning each project, exhibition and activity, careful consideration must be given to the learning styles, reception methods and cognitive habits of the target audience. This serves as the basis for curriculum customization, aiming not only to reach and attract those who are uninterested or unfamiliar with the existing content, but also to consolidate and deepen the educational foundation of sustainable fashion within the industry. Young people, as the focal point of this educational process, should be given more attention and resources so as to ensure that through creating dedicated learning paths and growth platforms for them, they can have access to comprehensive and in-depth climate change education that leads to the formation of green and low-carbon production and lifestyle concepts.

3. Innovative sharing platforms catalyse young people's spontaneous low-carbon practices

Innovative sharing platforms, as a medium ecosystem, can catalyse the spontaneous transformation of young people in the field of sustainable development. Through the clever integration of offline low-carbon cultural spaces and online efficient communication channels, these platforms not only achieve the widespread dissemination and deep penetration of low-carbon concepts and climate action information, but also create a youth community network based on a sustainable consensus and focused on low-carbon and climate issues. Within this community young people, as the main drivers of change, have their environmental awareness and low-carbon behaviours deeply influenced by the platform's content, gradually forming a shared understanding and value orientation toward sustainable fashion and low-carbon production and living. The platform, by providing diverse dialogue mechanisms and interactive spaces, facilitates the collision and fusion of ideas among young people, further stimulating their intrinsic motivation to construct personalized cognitive systems and low-carbon action frameworks. The emergence of this spontaneous transformative force is the result of the interaction and mutual reinforcement between platform innovation and youth initiative in the field of climate action. Through technological and model innovation, the platform successfully breaks the boundaries of traditional information dissemination and community building, providing young people with unprecedented opportunities and spaces to engage in low-carbon practices, discuss climate change and express themselves. In this highly resonant community, young consumers, united by the cultural bond of sustainable fashion, passionately exchange environmental ideas and collectively nurture more impactful green actions. Young industry elites, sharing a common vision, freely exchange industry insights and practical experiences, exploring and implementing green and low-carbon industry development models through brainstorming

and continuous learning. Thus, in the face of global climate challenges, innovative sharing platforms play an indispensable role in catalysing the spontaneous transformative forces of young people. They serve not only as crucial bridges for disseminating low-carbon knowledge and climate action information, but also as key stages for young people to achieve personal growth, engage in social change and collectively protect our planet.

Chalandri, Greece
Cultural Hidden IDendities ReAppear through Networks of WaTer: leveraging cultural heritage for blue-green urban regeneration

Case background

As the largest municipality in the North Athens Regional Unit, the suburb of Chalandri accommodates over 74,000 inhabitants across an area of 10,805 km[1]. Possessing a rich cultural history and architectural heritage, it is home to the subterranean Roman Hadrian Aqueduct. This 20 km long water infrastructure network connects seven municipalities and supplied the city of Athens with water for nearly 1,800 years from 140 AD until the early 1930s. In proximity to the municipality's centre, the aqueduct intercepts the Rematia stream, a waterway surrounded by a ravine which flows to most surrounding urbanized areas. As a protected nature resource with dense forest growing on the stream banks, this represents a primary ecological corridor in the region, providing pedestrians with a route to directly access local flora and fauna. Following the national economic crisis in 2009, the municipality shifted its focus to recovery policies to support the market and revitalize the local economy, prioritizing the development of services and leisure which put a strain on urban resources. Issues of weak mnemonic policy caused historic urban assets such as the Hadrian Aqueduct to become forgotten, hidden underground with several parts of the structure heavily decayed. And with a shift away from bottom-up processes, a lack of prioritization emerged in conserving and cultivating local cultural capital. This weakened the sense of ownership and belonging, and the municipality's heritage branding when compared to Athens's historic centre. Urban development has resulted in poor access to green spaces (with the stream surroundings creating a large green space that has remained inactive), reflected by 2.8 m^2 of parks per resident in Chalandri compared to 4.8 m^2 across Athens on average[1]. These issues have served to jeopardize the sense of local community, identity and resilience, especially in light of growing climate change impacts such as extreme heat and water stress.

Launched in July 2020, the Cultural Hidden IDendities ReAppear through Networks of WaTer (H.ID.RA.N.T.) project has worked to address these issues through a process of heritage-led regeneration. Focused on revitalizing urban water resources, Cultural H.ID.RA.N.T. has sought to redevelop the abandoned but still functioning Hadrian Aqueduct, and make it available to all citizens. Centred on blue-green infrastructure it is a means to re-inject vitality into the local community, facilitate the sustainable use of natural resources and adapt to climate change impacts. The municipality has leveraged the initiative as a driving force to establish a larger conversation strategy on efficient natural resource management, civil engagement and the participatory management of local services. In this regard, the project approaches the Hadrian Aqueduct as an element of cultural heritage, combining local history and the notion of water as commons, and an asset for blue-green urban regeneration in light of climate change and the need for community resilience.

Implementation process

1. Facilitating a participatory co-design and cross-governance project approach

Cultural H.ID.RA.N.T. operates within the framework of the European Regional Development Fund's Urban Innovative Action; a European Union initiative that provides urban areas throughout Europe with

1 Urban Innovation Actions. Available at: https://uia-initiative.eu/en/uia-cities/halandri.

resources to test novel and unproven solutions for urban challenges. The project was executed as a cooperation between eight partners[1] where, under a cooperative governance structure, each was delegated a specific working package for implementation and management, and decisions were made collectively via weekly coordination meetings with oversight from a project steering committee. The initiative distinguished itself operationally through the use of a cross-sectoral approach in which a co-operative governance system ensured citizens were involved throughout the design and implementation stages. Local citizens groups were established to facilitate co-design and co-governance processes ensuring the alignment of decision-making with the needs and aspirations of the local community themselves. Through sustained participation, this provided local community members with decision-making power in the management of project outcomes, including transition to the collective ownership of cultural heritage assets. Involving 13 school communities, youth engagement was also integral with young leaders involved in planning and implementation phases. School programmes and youth clubs were also involved in hands-on activities such as community clean-up events and tree planting, cultivating a sense of responsibility and stewardship among younger generations, see Figure 7.7. Youth representatives were invited to sit on the project's advisory board to help guide the trajectory of the initiative, where young volunteers and young professionals proposed innovative green technology solutions to restore historical sites such as the use of solar panels, energy efficient lighting and sustainable materials. Workshops and seminars were also held by young environmentalists to educate the community about sustainable practices. Community and youth participation was pivotal to embed equity and inclusivity into local regeneration plans and the water delivery system, and in documenting the aqueduct's history, and co-organizing cultural and public events.

Source: Available at: http://www.guangzhouaward.org/a/3316.html?lang=en

Figure 7.7 Children participate in the Cultural H.ID.RA.N.T. initiative

2. Establishing a digital archive and cultural festival

To effectively mobilize a heritage commons, Cultural H.ID.RA.N.T. used data to build upon the tangible and intangible aspects of Chalandri's heritage. With the aim of building a comprehensive digital repository of local history (Local Chalandri Archive), the initiative facilitated the collection of raw materials including institutional (technical and research-based) knowledge with everyday knowledge (oral, written history, grassroots memories and individual experiences, etc.), which was organized and systematized into an open platform to create a digital tool. From the beginning, the process was also used to simultaneously activate the local network of stakeholders. To gain knowledge on the relationship between residents and the history of the aqueduct as a water and cultural resource, the Mediterranean Institute for Nature and Man supervised an assemblage of oral history testimonies and historic and archaeological documents with contents from official archives in collaboration with public bodies, scientists, local groups and people with special needs. The archive was leveraged as both a cultural and educational tool to use the past as a means to understand the present context. The

1 The Municipality of Chalandri, Commonspace Coop (a cooperative design agency); Athens Water Supply and Sewerage Company; the Mediterranean Institute for Nature and Anthropos; Thymio Papayannis and Associates (an architecture and design company); the Regional Development Institute of Panteion University; Ohi Pezoume Performing Arts (a non-profit performing arts organization); and the East Attica Ephorate of Antiques (an agency under the Ministry of Culture).

knowledge acquired served as a common ground for development policies promoting environmental sustainability, cultural creation, social inclusion and democratic dialogue. The digital file was structured as an open system, hence the archive offered documented information in a comprehensive and attractive format for the general public, with digital multimedia narratives.

To promote awareness on water and the sustainable management of urban resources, the Hidrant Festival was created as an annual event, with the first taking place in September 2021, see Figure 7.8. The festival incorporated parts of the aqueduct into dedicated cultural performances and represented an important framework to continue the participatory activities of pupils and residents from previous months. The event helped to systematize the engagement of local associations and NGOs such as the Oral History Association, who organized urban walks for residents during festival days. The second festival was held in May 2022 in which the local archive data platform was officially launched. Such cultural events have promoted awareness on water and urban resource management, with citizen-led institutions developed to care for water, natural and urban resources, and infrastructure.

Source: Available at: https://www.archalandri.gr/show-item/community/

Figure 7.8 Local residents convene during the first Hidrant Festival in September 2021

3. Establishing "water as a commons"

To connect the water network to the lives of local community members, Cultural H.ID.RA.N.T. focused on blending intangible heritage components such as water commons with the physical regeneration of the urban fabric across four sites in the municipality. Covering

a total area of 21,400 m^2, locations for intervention included (1) the Gyftopoulou street area and a portion of the Rematia stream banks; (2) the Hadrian aqueduct reservoir and the Roman wells in El Alamein Street with the incorporation of a new underground water tank; (3) the Kodrou and Antistaseos street area through the integration of a larger underground reservoir; and (4) Eptanisou Street with the construction of a new green park. These sites were selected to become destinations for gatherings, activities, community, and networks and relations in order to build cultural capital in symmetry with the new water supply throughout the municipality. Between 7 ~ 8 percent (1,500 m^2) of renovation works were designed through the active participation of 709 students along with parents and teachers[1]. To reduce the obscurity of the aqueduct and bridge it closer to the community, public space proposals included key design features such as the valorization of visible structural elements as historical monuments, as well as the invisible underground route through architectural and landscape elements, see Figure 7.9. Design proposals also promoted the integration of pumping stations and infrastructure for the extraction of non-potable water in new public spaces, and the increased greening of existing outdoor space to support climate adaptation. By designing the water infrastructure as a tangible resource, the aqueduct now functions as a playful element in the urban spaces, illuminated by new lighting instalments.

Source: http://www.guangzhouaward.org/a/3316.html?lang=en

Figure 7.9 Local community members inspect infrastructure connected to the water network

To date, the development of new water infrastructure has generated 8,500 m^2 of new public space[2], with the longer-term aim of realizing 24,000 m^2 in addition to planting 14,800 shrubs and 180 trees[3]. The construction of 5 km of new water irrigation piping overlaps with a number of specific points in which the pipe system is connected to underground pumps and reservoirs. In addition, two mobile water tank trucks were procured to divert water to those areas of the municipality lacking a direct connection to the new water infrastructure network. By promoting water conservation techniques such as rainwater harvesting and efficient irrigation systems to combat issues of climate-induced water scarcity, this has resulted in annual purposeful water abstraction savings of 25,000 m^3 [3 4].

The new Hadrian network marks the first urban non-potable water network accessible to individuals in the European Union, where the initiative has leveraged water as an effective cultural heritage ambassador using the re-introduction of the Hadrian aqueduct as a collective sense-making process for sustainable regeneration. It has enhanced the quality of the urban environment through the sustainable use of natural resources, heritage branding and the delivery of new high-quality public spaces. Urban greening and community-centric sustainable water infrastructure has strengthened the endogenous resilience of the municipality to localized climate change impacts. By tapping water networks, the initiative has revealed local cultural capital and the tangible and intangible heritage of the municipality. Chalandri now receives around 5,000 visitors per weekend and has experienced a 300 percent increase in usage of quality green spaces[5].

1 Available at: https://www.chalandri.gr/uncategorized/103146/.

2 Urban Innovative Actions. Available at: https://uia-initiative.eu/en/uia-cities/halandri.

3 Urban Innovative Actions. Available at: https://www.uia-initiative.eu/en/news/detours-corrections-deviations.

4 Available at: https://urbact.eu/partnersearchtool/cultural-hidrant.

5 Available at: https://atlas.hubin-project.eu/case/cultural-hidrant/.

Reference experiences

1. Value historic urban water infrastructure as cultural heritage assets and encourage their reintegration into urban environments for resilience building

The regeneration of Chalandri's neglected Hadrian aqueduct combined with greening interventions has marked an innovative strategy by which to counter the effects of localized climate impacts, address environmental degradation, raise awareness on environmental safeguarding and revive the historical heritage of the local community. The initiative showcases that where drought poses increasing threats to even water-rich areas, by safeguarding natural water resources and instilling responsible habits in local citizens, historical knowledge on water networks combined with modern engineering solutions can curate unique pathways to strengthen communities and accelerate sustainable, climate-resilient urban development. The reintegration of hidden urban water resources can thus not only help to amplify tangible and intangible cultural heritage resources as a culturally negotiated solution, but also serve as a key resilience building component in light of urban vulnerability to environmental change.

2. Recognize the significance of the collective ownership of urban water resources and water as a commons through co-governance

Via a collective approach to water management, the Cultural H.ID.RA.N.T. initiative places emphasis on communal ownership and citizen empowerment whereby water functions as the linkage point between: heritage and community; physical and intangible action; symbolic values and emerging vocations; and sustainable resource use and climate resilience. The application of such an integrated approach via active citizenship breaks the habitual rules, customs and structures of conventional policymaking, and instead stimulates historic and cultural heritage development and sustainable infrastructure management though civic participation. The initiative has facilitated the creation of a new culture and relationship between the environment, natural resources and urban space in the municipality, nurturing the active and democratic participation of citizens. To foster a sustainable approach to water management, the shared responsibility of natural resource management can help build community resilience, enhance the well-being of residents and enable a sustainable approach to urban placemaking in line with the SDGs and the New Urban Agenda.

Chengdu, China
Youth Power in the Luxelakes Park Community

Case background

The Luxelakes Park Community, see Figure 7.10, is located in the Tianfu New Area of Chengdu, the birthplace of the "Park City" concept.

A Park City is not simply the pairing of "park" and "city," but rather the coupling of two sets of systems: natural ecosystems, and human production and living systems. The concept emphasizes the idea of a city "growing out of parks"[1]. Since the idea was first proposed in 2008, Chengdu has successively produced top-level design documents such as the *Chengdu Beautiful and Livable Park City Plan (2018—2035)* and *Chengdu Future Park Community Planning Guidelines*, aiming to establish a demonstration area for park cities and gradually initiating forward-looking park community construction.

Luxelakes, a model park community located in the core area of Chengdu's Tianfu New Area, covers more than 8,000 acres including 2,400 acres of water. The interwoven water systems and green landscapes will eventually accommodate nearly 200,000 permanent residents. The foundations of Luxelakes were laid in 2009, even before the Park City concept emerged. It embodies the essence of the concept, having undergone a complete transformation from land irrigated by diverted water to an ecological lake, and then building a "water city" upon it—a community that

1 Liao Maolin, Zhan Yanhong, Zhou Ling, et al. Guiding Values of Xi Jinping Thought on Ecological Civilization to "Park City" Construction [J]. China Population Resources & Environment, 2021, 31(12): 140–148.

Source: Provided by Luxelakes Community Foundation

Figure 7.10 The Luxelakes Park Community

has truly grown out of a park.

One major challenge faced by all park communities is the long-term management and maintenance of the vast public areas within the community, including lakes and green spaces, which serve as open urban resources. Luxelakes Park Community is no exception; it must fully consider how to continue management of the community's natural ecosystems after the developer exits. Luxelakes's solution is to adopt a cultural approach, cultivating ecological civilization and public traditions through diverse cultural and recreational activities within the community. This approach encourages residents to align actions with knowledge and practice lifestyles conducive to ecological conservation. In particular, the community has leveraged the power of young people and deliberately fostered a "child-friendly" environment so that the next generation can be subtly influenced as they grow. The primary implementer of this case is the Luxelakes Community Foundation, which was initiated and funded by the developer, Chengdu Wanhua New City Development Co., Ltd. The Foundation has since integrated government grants and social donations, and is responsible for promoting the community's development in areas such as green environmental protection, child-friendliness, culture and arts, and deliberative consultation through public welfare funding.

Implementation process

Each year, the Luxelakes Community Foundation advocates for and develops a series of public education and participatory projects centred on ecological themes and sustainable, low-carbon park community operations under the "Green Action Plan". These projects include ecological wetland creation and education, urban biodiversity education and the reuse of composted landscaping waste from park areas. Luxelakes Park Community also emphasizes embedding the concepts of the harmonious coexistence of humans and nature and the humanistic concern for natural ecology into daily community life, and infusing them into a variety of cultural and recreational activities. The goal is to subtly cultivate a sound ecological civilization. In this process, the core role of the Luxelakes Community Foundation is to empower, connect and nurture, providing a supportive platform and resources for Luxelakes residents or stakeholders who wish to contribute their efforts. A broad group of young people, including university students concerned with the development of Luxelakes and young residents within the community, are becoming the backbone of these initiatives.

1. University student-designed park community

From October 2022 to July 2023, the international non-profit organization C40 Cities Climate Leadership Group

held the second "C40 Students Reinventing Cities Global Competition". The competition's goal is for cities around the world to offer community projects that are either in development or awaiting redevelopment, encouraging university students to propose innovative design solutions for green and prosperous communities to address climate challenges. Chengdu's Luxelakes Park Community was selected as one of the competition topics along with community projects from 11 other international cities such as Barcelona, Spain; Melbourne, Australia; and Milan, Italy serving as a "design challenge" for young students. The Luxelakes Community Foundation and Luxelakes Park Community, as local implementation partners, collaborated with multiple entities including the Foreign Affairs Office of the Chengdu Municipal People's Government, Chengdu Municipal Committee's Social Work Department (Social Governance Committee), Tianfu New Area Party and Mass Work Department, and the international non-profit organization C40, providing a platform for young people to apply their knowledge and imagination in exploring sustainable urban solutions.

After Luxelakes Park Community was chosen as a design target, a competition briefing team consisting of the Foreign Affairs Office of the Chengdu Municipal People's Government, Chengdu Municipal Committee's Social Work Department (Social Governance Committee), and C40 visited universities in Chengdu such as Southwest Jiaotong University, Chengdu University of Technology and Chengdu University. They explained the competition rules to the students, shared basic knowledge on how green communities can address climate challenges and helped them to refer to the development status of Luxelakes as the "subject". Multidisciplinary teams were made up of students from fields such as urban planning, architecture, environmental science, business, real estate development and management, engineering and the arts.

Participating teams were encouraged to conduct on-site investigations in Luxelakes Park Community. To facilitate the participating teams, the Luxelakes Community Foundation recruited six volunteer coordinators from university students in Chengdu, and invited professionals familiar with the community to serve as "mentor volunteers" such as Mr Fan Tihui – a board member of the Luxelakes Community Foundation, and Mr Chen Fei – Investment and Research Manager at the Wanhua Investment Group's Strategy and Research Department. The mentors guided the students' community investigations to make their design proposals more practical.

The team SUMMER AS YOUNG from the Chengdu University of Technology ultimately won the competition's Excellence Award. In addition to improving organic waste management and rainwater collection and irrigation, the winning proposal specifically pointed out that Luxelakes, as a park community with multiple waterways and bridges, could creatively utilize some of the spaces under the bridges into unique underpasses for cultural activities such as art exhibitions and concerts. Solar panels and vermiculture composting units could also be installed to create an ecological garden. The proposal further envisioned a community sharing service for "idle items" to facilitate their circulation. This demonstrated the students' attempt to enhance the resilience of a green and prosperous community through unconventional, cultural and artistic approaches. Similar innovative solutions were abundant in the proposals submitted by other teams.

The competition established a platform between university students and the community wherein multiple forces connected, allowing student participation in community design to go beyond "theorizing" and become the starting point for empowering youth to shape green homes. After the competition, the Luxelakes Community Foundation hosted the "Green Prosperity Community: Youth Power Workshop" and invited competition stakeholders, volunteers and community representatives to review the proposals and discuss how to implement the students' ideas within the community. The idle item community circulation mechanism proposed by the SUMMER AS YOUNG team is already becoming a reality. Yang Lu, the C40 competition project leader for the Luxelakes Community Foundation, stated that the foundation hopes to develop a series of sustainable plans in the areas of youth power and near-zero carbon communities, continuing to provide university students with a stage for practice, a platform for exchange and extensive employment opportunities in the field of

near-zero carbon communities.

2. Youth-created festivities in Luxelakes Community

To foster a strong emotional connection between residents and the natural environment, Luxelakes Park Community has established three cultural festivals: the annual Luxelakes Fishery Harvest Festival as shown in Figure 7.11; Luxelakes Co-Creation Night; and Luxelakes Dragon Boat Festival as shown in Figure 7.12. Table 7.1 provides an overview of the themes, activities and participation at the festivals.

Source: Provided by Luxelakes Community Development Foundation

Figure 7.11 The Fishery Harvest Festival Parade

Source: Provided by Luxelakes Community Development Foundation

Figure 7.12 Luxelakes Dragon Boat Festival

The common thread among these three festivals is vibrant co-creation with a focus on ecology.

Vibrant co-creation: each community festival is collaboratively organized and implemented by the Luxelakes Community Foundation, community residents and volunteers, with a particular emphasis on youth. The Luxelakes Community collectively refers to Luxelakes property owners, residents, local institution staff and individuals who share the values of Luxelakes as "Lukers". They encourage like-minded Lukers with common interests to form various themed Luker communities such as the Luker Photography Club, Luker Elegant Gathering Club, Luker Art Club,

Table 7.1 Overview of Luxelakes Community Cultural Festivals

Festival	Luxelakes Fishery Harvest Festival	Luxelakes Co-Creation Night	Luxelakes Dragon Boat Festival
Time	Every Autumn (September–October)	Every Chinese New Year's Eve (January)	Around Dragon Boat Festival (June)
Theme	Reshaping Local Culture	The Community's Own "Spring Festival Gala"	Preserving Traditional Festivals
Activities	Land and water parades, cultural markets, local heritage exploration, neighbourhood feasts and ecological education	Residents and Luxelakes communities sign up for programme auditions, with the selected programmes arranged by the directing team. The evening event features a variety of presentations including singing, dancing, performances, discussions and neighborhood feasts	Opening performance on water, dragon boat races, children's dragon boat race, water-based fun competitions, summer concerts, night parties, etc.
2023 Total Volunteer Service Hours	1,858 hours	1,462 hours	1,084 hours
2023 Number of Participants	25,000 offline participants, 900 co-creators	400+ performers, 2,000+ offline participants, 300,000 online views	7,730 offline participants, 36,000 online views

Data source: Luxelakes Community Foundation

Luker Design Sharing Club, Luker Taste Cuisine Club, Luker Baking Society, Luker Love Beauty Society – Social Dance Group, Luker Children's Joy Society, Luker English Drama Society, Luker Gardening Club, Lushan Property Owners Dance Team, Luker Farming Society, Luker Calligraphy and Painting Society and the Luker Reading Society. These groups, similar to university clubs, can apply for funding from the Luker Community Federation after being certified. Certified groups with a membership system can apply for matching funds of up to RMB 20,000 per year provided they submit an activity plan and contribute volunteer hours to the community. Lukers with various talents play key roles in organizing and participating in the three main community festivals. Other residents can participate in various capacities such as publicity or event execution volunteers, or by forming small teams to manage specific event areas.

Focus on ecology: while these festivals enrich the community's cultural and recreational life, and strengthen emotional bonds among residents, they are also designed with ecological themes in mind. The Luxelakes Dragon Boat Festival is directly linked to "water culture" by featuring traditional dragon boat races, innovative activities such as the "duck catching" competition and pre-race opening performances, all using Luxelakes' public water systems as the "arena" and "stage," allowing participants to enjoy the pleasures of water. The Luxelakes Fishery Harvest Festival is a more comprehensive event that starts with water elements and introduces environmental themes. Through artistic parades, street art and installation art, it encourages participants to reflect on the importance of habitat protection. Although Luxelakes Co-Creation Night is a grand celebration to welcome the new year, it also incorporates environmental themes into its content. For instance, the 2022 event featured a segment reviewing the community's environmental initiatives and promoting good practices in ecological protection.

Guided by these cultural and entertainment activities, people immerse themselves in the concept of sustainable development. As a result, when various green initiatives are introduced into the community, they achieve higher participation and acceptance.

3. Guiding children's participation in community affairs through drama

On 14 April 2021, the Luxelakes Community Foundation launched the "Luxelakes Child-Friendly Community" project plan, aiming to involve the next generation in public community life by making them active participants in the community's co-construction.

The community first established a Children's Council to grant children the right to participate in community development. Each session of the Children's Council invites local children to engage in discussions around a specific topic. For example, in the fourth session in 2023, 25 children from the community and surrounding schools discussed, "What can the community do in the context of climate change?" The council introduced drama education to help children grasp abstract discussion rules. Under the guidance of professional drama teachers, the children quickly adapted to the scenario, distinguished facts, made assessments, discussed causes and proposed solutions, see Figure 7.13. During this process, the teachers collaborated with council mentors to translate broad concepts such as climate change and low-carbon goals into everyday life experience. This helped the children to observe, analyse and understand from a personal perspective, enabling them to truly participate in civic life. In response to the overarching question, "What can we do to reduce carbon emissions?" the children proposed practical actions such as waste sorting, cycling instead of driving, avoiding food waste, and planting more trees and grass. The session concluded with three proposals from the children: (1) putting on a play aimed at promoting "pollution reduction, green consumption and a low-carbon sustainable lifestyle" to be performed at major community and school events; (2) creating a stop-motion animation using traditional shadow puppetry with the theme "waste sorting" to be promoted on various online platforms; and (3) designing posters advocating "reducing food waste" to be displayed in schools, communities and restaurants. These proposals were submitted to the community foundation for discussion alongside other proposals from adults. If approved, the community will mobilize resources to implement them. The key aspect of this process is showing the children that their efforts can lead to real change.

Source: Provided by Luxelakes Community Development Foundation

Figure 7.13 A session of the Children's Council

The community also creates diverse opportunities for children to express their understanding and reflections on the environment through dramatic performances. On Earth Day, 22 April 2024, Luxelakes Park Community invited families to participate in an improvisational short play titled "Planet vs. Plastics" using natural elements from Luxelakes as props, see Figure 7.14. Participating families formed teams representing underwater worlds, land creatures and human life. They each considered, "What problems and harm do plastics bring to plants and animals?" and developed stories, costumes and props. After dark, the parents and children performed their stories in a unique blacklight theatre where a completely dark stage was

Source: Luxelakes Community Development Foundation

Figure 7.14 Parent-child co-creation and performance of Planet vs. Plastics blacklight theatre

illuminated with fluorescent lights, casting a magical effect that vividly depicted the impact of plastics on various lifeforms and humans.

Using educational drama to advance children's involvement and ecological education, this culturally based method fosters strong engagement in young children and plants the "seeds" of building a green and prosperous home early in their development.

Reference experiences

1. Design competitions empower youth participation in green community building

Cities worldwide are increasingly utilizing urban redesign competitions to harness the creativity of top designers, architects and innovators for the purpose of urban renewal. In the case of the C40 Students Reinventing Cities Global Competition at Chengdu's Luxelakes Park Community, the same approach took on a deeper significance. It not only facilitated the exploration of optimized solutions for creating beautiful homes but also provided a genuine opportunity for young students who have not yet entered the workforce or stood on the main "stage" to participate in urban development. On the one hand, the competition required the teams to submit practical, implementable proposals and encouraged young students to bridge their in-class design thinking, professional knowledge and sustainable development concepts with real-world urban construction, serving as a meaningful rehearsal for future projects. And on the other hand it inspired the students to apply their innovative insights, allowing this highly creative and vocal group to spark unconventional ideas that could challenge and inspire professional designers, architects and planners. Such collaborative efforts can lead to a new era of climate action unlike any before.

Similar student design competitions can serve as a starting point for youth to directly engage in building green communities. However, organizers should pay attention to two key points. First, ensure a "mutual commitment" between the target community and students, where the community as the subject in question should offer organized site visits and share relevant information to support the students' designs. Second, establish a post-competition response mechanism including reviewing student proposals, creating platforms to connect stakeholders and facilitating the implementation of promising ideas, thereby providing more opportunities for students to participate in community design.

2. Co-creating festivals empowers youth to lead eco-education initiatives

Action stems from awareness, however, public understanding of climate change science and sustainable practices remains insufficient or often limited to a macro-level acknowledgment without individual-level recognition or engagement. This case highlights how the community foundation, in collaboration with various Luxelakes groups,

significantly improved the reach and effectiveness of public eco-education through the co-creation of community festivals, cultural works and interactive activities. On the one hand, the festival themes cleverly connected with elements of daily life related to climate action, particularly the unique aquatic ecosystem of Luxelakes Park Community, serving as a key entry point for participants. They first developed a love for their local water environment which naturally fostered a sense of responsibility for water conservation. And on the other hand, the primary creators of these community festivals – the youth-driven Luxelakes groups – leveraged their artistic talents in music, dance, theatre and the visual arts. In the process of creating, rehearsing and organizing these activities, they consciously or unconsciously integrated sustainable development concepts and practices related to ecology into their projects. Given the powerful cohesion and impact of festival culture, this approach not only established a platform for spreading scientific knowledge but also effectively cultivated a social atmosphere of advocating for sustainable living.

3. Educational drama empowers the next generation to face climate challenges

In this case, educational drama was used to guide children in community discussions. Essentially, educational drama is a method that applies theatrical techniques in classroom teaching, primarily using role-playing, thematic development and situational settings to conduct related educational activities and ultimately achieve the goal of educating students[1]. This method transforms abstract concepts into tangible relationships between people, and seeks possible outcomes through the creation of scenarios. It helps young children to form a solid understanding of abstract concepts such as the climate crisis and sustainable development, providing the next generation with scientific ecological education. It holds unique value for humanistic education as it plants the seeds of humanistic values in students through "life experiences" and "metaphorical connections"[2]. As the students grow, these "seeds" may blossom into a deep care for life and respect for humanistic values, ultimately leading them to take concrete actions that contribute to achieving the SDGs.

Singapore Youth4Climate Festival

Leading the way in the green transition, Singapore has accelerated efforts to tackle the climate emergency, emphasizing the need for urgent and collaborative action from diverse communities. Led by City Developments Limited (CDL) to support the Go Green Singapore Week and organized by the Singapore Ministry of Sustainability and the Environment, the Youth4Climate Festival represents CDLs annual flagship youth environmental outreach programme promoting green culture and sustainable livelihoods in the city. Through diverse forms of creative expression such as arts, film and music, the event serves as a creative platform to advocate for and educate on green lifestyles and culture among young people in the city. First launched in 2018, the festival aims to provide Singapore's youth with a platform to express their passion for the environment and green aspirations for the future via workshops, talks, musical performances, film screenings and other dynamic fringe activities.

Following six years of cooperation, the festival held its sixth event from 8 to 9 July 2023 in partnership with South Beach Consortium. In correlation with Go Green Singapore's aim to encourage the community to take collective action towards a sustainable future, CDL organized a number of climate-themed activities and

1 Li Yingning. Drama Education and Theatre Education in Britain [J]. Theatre Arts, 1997(01): 56–60.

2 Yan Mengshuai and Tuo Dandan. Returning to Humanity: Theoretical Exploration of Integrating "Educational Drama" into Humanistic Education. Modern University Education, 2021, 37(06): 29–36, 111.

initiatives. To highlight CDL's long-term commitment to raising awareness on sustainability, a number of youth groups were assembled to conduct workshops on topics such as climate action and activism, climate policy and regulation, and climate science and education. The festival also featured an eco-marketplace with 40 vendors including Zero Waste Singapore, Darifarida, Metier Foods and Soil Social promoting sustainable and eco-conscious living. Each day of the festival was concluded with film screenings of Happy Feet I and II in line with CDL's third climate action exhibition "Melting Ice, Sinking Cities" in which young people, family and friends could watch climate-related films to raise awareness. Serving as the finale to the Go Green Singapore week, a Youth4Climate Concert took place, incorporating a line-up of 11 youth-led musical acts as well as three storytelling sessions run by previous winners of the My Tree House "We Love Our Planet" storytelling contest, see Figure 7.15.

As an annual event, the Youth4Climate Festival therefore provides a pathway in which innovative youth programmes can cultivate and nurture future green champions. By amplifying the voice of young people in the climate change arena, the event builds foundational knowledge and raises awareness on climate change through creative modalities. The festival promotes eco-consciousness and innovative action to cultivate an urban society in which lifestyles support the achievement of global and national climate targets to ensure a sustainable urban future for all.

Source: Provided by City Developments Limited

Figure 7.15 Youth participants at the 2023 Youth4Climate Concert

Korogocho, Kenya
Future Yetu (Our Future) project: using digital storytelling to engage in community climate action

Korogocho, Kenya's fourth-largest informal settlement, is located in the northeastern part of the capital, Nairobi. Its low-lying terrain and inefficient drainage system make it highly vulnerable to climate change. Climate disasters such as floods and storms damage homes and infrastructure, leading to food shortages and water supply disruptions while exacerbating the spread of waterborne diseases. Covering an area of just about 1.5 km^2, Korogocho supports the livelihoods of nearly 200,000 people. The residents of this area are mostly disadvantaged groups who have migrated from other slums. Due to limited awareness coupled with a lack of information and resources, they often struggle to effectively cope with the impacts of climate disasters, making them particularly vulnerable and helpless in the face of climate change challenges. Funded by the Cities Alliance, the youth-led community organization "Hope Raisers Initiative" launched the "Future Yetu (Our Future)" project in Korogocho. This project uses digital storytelling and a three-phase approach to disseminate knowledge about climate change and disaster response, amplifying the voices of the community, and building a communication bridge between the community and decision makers on climate issues.

Phase 1: Conduct a baseline survey to inspire digital storytelling. Through in-depth interviews and online questionnaires with local community members and leaders, media and NGO stakeholders, the project collected information on Korogocho residents' understanding and perspectives on climate change, gaining insights that could trigger personal narrative creation.

Phase 2: Host a creative workshop to teach digital storytelling tools. The project members held a 3-day digital story creation workshop in the local area and invited 20 representatives from different groups including women, youth, teachers, religious figures, community activists, persons with disabilities and staff from Nairobi's environmental department. They were taught skills in using new media communication tools enabling them to create scripts, produce videos as shown in Figure 7.16, and share their experiences through storytelling or artistic performances in order to illustrate the impact of climate change on the community and daily life, raise awareness about the social issue of the climate crisis, and call upon the younger generation to take action. The videos were looped on matatu minibuses and spread throughout

Source: Available at: https://www.citiesalliance.org/resources/publications/global-knowledge/future-yetu-our-future

Figure 7.16 Korogocho residents creating climate-themed videos

Korogocho via the bus routes, sparking discussions among local youth and garnering continued attention from the government.

Phase 3: Create "Carbon Sink Pocket Parks" to cultivate low-carbon awareness among the younger generation. The project members built a Carbon Sink Pocket Park at a local community school. This green space integrates education, ecology and community engagement. By planting fast-growing bamboo and other plants, the project not only provided the community with carbon sink resources but also used the park to host digital story screenings, thereby educating the next generation about climate change, fostering their environmental awareness, and enhancing their ability to respond to the climate crisis. This, in turn, will help them to grow into the backbone of future climate problem solvers.

A key highlight of this case is the clever use of digital storytelling strategies to empower each individual to take on the role of a participant and narrator in climate issues. This innovative approach resonated particularly well with youth, easily sparking deep resonance and enthusiasm for active participation. Under the guidance of shared goals and values, the youth can transcend traditional boundaries to engage in dialogue with the government, deeply involving themselves in the planning and formulation of climate policies, and thus transforming from mere observers into active participants. The digital storytelling designed and promoted by youths can transform cold scientific facts into accessible information and emotionally impactful stories, helping residents to form a personal connection with climate change. This approach fosters a sense of engagement and self-governance among all residents regarding climate action. Additionally, by participating in the creation and dissemination of digital stories, young people hone their digital tool skills in practice, and master the key abilities to express themselves and influence society in the information age, laying a solid foundation for them to play a more active and leading role in sustainable development in the future.

Policy suggestions

1. Explore the intrinsic connection between local cultural elements and climate change, and construct a climate narrative framework with regional characteristics and contemporary features

(1) Encourage young scholars and researchers to use innovative research methods and tools such as big data analysis and artificial intelligence simulations to explore the intrinsic connection between local cultural elements and climate change. This should be further expanded to the construction of cultural adaptability and climate resilience, providing theoretical foundations and empirical support for climate policymaking.

(2) Guide youth to become the main force in building local cultural climate archives, using digital technology and new media platforms to creatively record and disseminate stories of local culture and climate change. Through youth interpretations and creations, climate narratives can become more relatable to young people, enhancing their sense of identity with local culture and their attention to climate change.

(3) Establish a practical platform for young designers by initiating a series of regionally distinctive climate-adaptive design projects, such as green community renovations and protective restoration of cultural heritage sites. These projects should aim to design public spaces and landscapes that reflect local climate characteristics, preserve regional cultural features and effectively address climate change challenges, thereby achieving the harmonious coexistence of cultural heritage and ecological civilization. Let young designers practice skills and gain experience in real-world scenarios.

2. Integrate green and low-carbon concepts into diverse educational models to cultivate globally competent youth climate leaders

(1) Develop and implement multidisciplinary curriculum systems that integrate green and low-carbon concepts across all types and levels of schools. These should integrate climate science, environmental policy, sustainable development concepts and ecological culture, and employ experiential teaching and inquiry-based learning to connect young students with the real world. This approach will cultivate students' systematic thinking and innovation abilities, enabling them to flexibly apply interdisciplinary knowledge frameworks to effectively tackle the increasing complexity of climate change challenges.

(2) Leverage the unique value of cultural arts in environmental education by using various creative forms such as art, theatre, film production and literary creation to transform complex climate science data and abstract environmental policies into vivid visual and auditory experiences. This approach will deepen public understanding, including that of youth, of the necessity and urgency of climate action, and inspire the creative passion and deep exploration of young artists on climate change topics. It will also nurture future leaders in the climate field who possess both cultural sensitivity and environmental responsibility.

(3) Strengthen the linkage between green cultural festivals and community education. Through low-carbon and environmental-themed cultural festivals, combined with community education courses such as lectures, interactive workshops and online classes, knowledge of climate change and low-carbon living can be disseminated to community members. This will raise awareness of participation, environmental consciousness and a sense of ownership among residents, fostering a consensus that everyone should contribute to creating low-carbon communities and everyone is responsible for protecting the ecological environment. In this process, youth should be given core roles such as volunteer leaders, event planners and environmental advocates. By participating in these roles, they can enhance their environmental awareness, organizational coordination and social responsibility, collectively creating a trend towards a green and low-carbon society.

3. Encourage youth to develop green skills for the future and build a green supply chain for the cultural industry

(1) Implement energy-saving and emission-reduction initiatives, promote the use of eco-friendly materials and adopt sustainable production methods through green skills enhancement programmes tailored for young professionals in industries such as fashion, film and television production, cultural tourism and cultural entertainment. Establish green cultural industry standards to achieve energy saving, carbon reduction and ecological sustainability in the cultural industry.

(2) Create a green skills incubation platform for the cultural industry, gathering innovative resources within the industry, such as design studios, technical laboratories and startup incubators to provide spaces for youth to showcase, exchange and grow their innovative ideas. Encourage young creators to incorporate climate-friendly concepts into all aspects of design, production and operation, collectively exploring new paths for the cultural industry to mitigate the climate crisis and promote ecological sustainability.

(3) Establish an integrated online and offline green skills exchange system to facilitate youth experience sharing, in-depth technical research and collaborative innovation, accelerating the optimization, iteration and quality improvement of green, low-carbon cultural products. Additionally, provide targeted market demand guidance, supported by diversified promotional and guidance strategies, to deepen consumers' understanding and preference for green and low-carbon cultural products. This will ensure the efficient operation of the entire chain from the inception of creative ideas to market adoption, thereby advancing the cultural industry toward a greener and more sustainable direction.

Chapter 8

Governance: youth-oriented urban and community co-governance platforms

Introduction[1]

A radical reform in urban governance is needed as the world experiences more extreme weather events, rising sea levels and accelerated biodiversity loss. With traditional governance approaches increasingly ineffective in meeting these complex and ever-changing environmental challenges, it is a pressing task for city managers worldwide to improve urban resilience to climate change and optimize resources allocation.

In this context, young people, as the primary force of future societies, show immense potential in tackling climate change and promoting sustainable development. According to the World Bank, youth aged 15 ~ 24 comprise approximately 16 percent of the total global population, a figure that is particularly significant in developing countries[2]. The innovative thinking, strong sense of responsibility and future-oriented mindset of young people make them irreplaceable in driving climate action and social change. Through proactive engagement in urban governance and community building, youth can contribute their ideas and technical skills, and also lead and accelerate sustainable urban development.

While youth possess significant potential in advancing sustainable development, in reality they are met with numerous impediments including a lack of formal access to decision-making involvement, insufficient resources and support, and inadequate perception of and education on climate change action. These issues are reinforced and exemplified by a UNDP survey which suggests that the majority of young people feel that their voices often go ignored in local policymaking[3]. Inadequate attention given to the perspectives of youth in urban planning and decision-making processes leaves young people with few opportunities to be part of effective climate action. Youth are a group prone to marginalization given existing social and economic structures, which holds back their innovative ideas and solutions from gaining support and dissemination.

To remove these obstacles and fully harness the positive role of youth in combating climate change, it is crucial to establish youth-friendly urban and community governance platforms, whose key task lies in prioritizing youth participation and empowerment under current social settings. This is to ensure they have the opportunities, support and capability to engage effectively in climate action and urban governance. With the readiness of systematic mechanisms and tools, and provision of education and resource-related support, youth can be encouraged to contribute their knowledge, insight and ability in undertakings such as low-carbon transportation, green infrastructure development and community sustainability.

To explore how these measures can be effectively implemented, this chapter presents three case studies which highlight the role of youth in urban governance and climate action; as well as the challenges they face with the aim of offering practical insights for other cities. The first case study is of Buenos Aires. In 2020, Buenos Aires launched the BA Climate Action Platform, an online tool providing open access to environmental data and metrics to increase youth and public engagement in local policymaking[4]. Through this platform, all urban citizens including youth can access

1 Authors of this chapter are: Peng Zhenwei, Chen Chen, Huang Yi, Liu Chao, Cao Zhan, Li Yan, Wei Wei, Yan Xinhang, and Chen Shiyun from Tongji University; and UN-Habitat.

2 World Bank. Tariq Khokhar. Chart: How Is the World's Youth Population Changing? Available at: https://blogs.worldbank.org/en/opendata/chart-how-worlds-youth-population-changing. April 17, 2017.

3 UNDP. Fast Facts: Youth and Gender Equality. Available at: https://www.undp.org/publications/fast-facts-youth-and-gender-equality. March 13, 2017.

4 Buenos Aires Ciudad. Available at: https://www.buenosaires.gob.ar/.

environmental data such as air quality and greenhouse gas emissions. And with around 30 percent of platform users being aged 18–30, a significant increase in youth participation has been observed. This transparency encourages greater youth influence and innovation in climate action. Highlighted in a boxout, the Los Angeles' Mayor's Youth Council for Climate Action (MYCCA) facilitates new communication channels between city leaders and youth, and offers a key platform for youth-driven climate initiatives in the city. The second case study presents Lima's Youth Action initiative which has promoted active youth involvement in local governance through the establishment of youth councils and training programmes[1]. It has led to several youth-led community projects and strengthened young people's roles and influence in urban decision-making. And the third case study is from Mombasa, Kenya. Since 2009, the Big Ship community organization has been encouraging youth participation in ecological preservation through mangrove restoration projects and economic empowerment programmes[2]. Thanks to these projects, youth have not only participated in environmental governance but also gained economic support which enhances their leadership within the community.

These examples demonstrate how specific actions and policy support can unleash the potential and enthusiasm of youth in urban governance and climate action. Youth, as the driving force of the future, play a critical role in addressing climate change and promoting sustainable urban development. The availability of solid youth-friendly governance platforms enables cities to better mobilize youth and tap into their creativity, allowing them to give full play to their potential for innovative solutions and environmental action to foster more inclusive and sustainable urban development. Looking forward, the hope is for more cities to draw on the successful experiences presented in this chapter, actively explore new channels for youth participation, and create more inclusive and engaging policies and mechanisms. A city's resilience and ability to respond to global climate change will therefore be further enhanced to ensure that all residents – regardless of age – can share a healthier, more sustainable future.

Case studies

Buenos Aires, Argentina
The Buenos Aires Climate Action platform: enabling citizen-driven urban climate action

Case background

Whilst cities accommodate just 3 percent of the total global surface area, they consume 80 percent of energy and emit around 70 percent of greenhouse gases[3], reinforcing the importance of strategic urban plans to develop effective climate policies for resilient and sustainable urbanization. Municipalities are pressed to facilitate comprehensive stakeholder involvement and access to governmental information on climate change to foster equitable approaches to climate resilient development for all urban residents and communities, enabling them to effectively navigate local climate risks. In 2017, Buenos Aires became one of the first 25 cities in the world to pledge a commitment to achieving carbon neutrality by 2050. To accelerate more responsive urban action on climate change, the city launched the BA Climate Action platform in 2020; an online, interactive platform comprising open data on environmental management through the integration of several measurable climate-related indicators. As a core objective, the platform aims to facilitate public access to environmental information and encourage civic activation; incentivize the democratization of climate change information and ensure the

1 Available at: https://www.munlima.gob.pe/.

2 Big Ship. Available at: https://bigship.org/.

3 Observatory of Public Sector Innovation. BA Climate Action. Available at: https://oecd-opsi.org/innovations/ba-climate-action.

accountability of government actions on reducing carbon emission; and enhance citizen participation through concrete actions in the process of cultural change to mitigate climate change risks.

As the first city globally to combine open data governance with the climate change agenda, Buenos Aires has sought to engage and inspire the city's residents as active players in climate action with the vision of becoming a carbon neutral, resilient and inclusive city by 2050. The deployment of an open information approach is fostering dialogue between the government and a diverse range of non-state actors through unique datasets that converge key climate and environmental information, urban citizens are brought to the forefront of local climate action processes. Based upon transparency, collaboration and citizen participation, the strategy employed by Buenos Aires has also presented young people in the city with the opportunity to have a direct impact on local government policies and action in the climate change arena.

Implementation process

1. Initiating a process of co-design

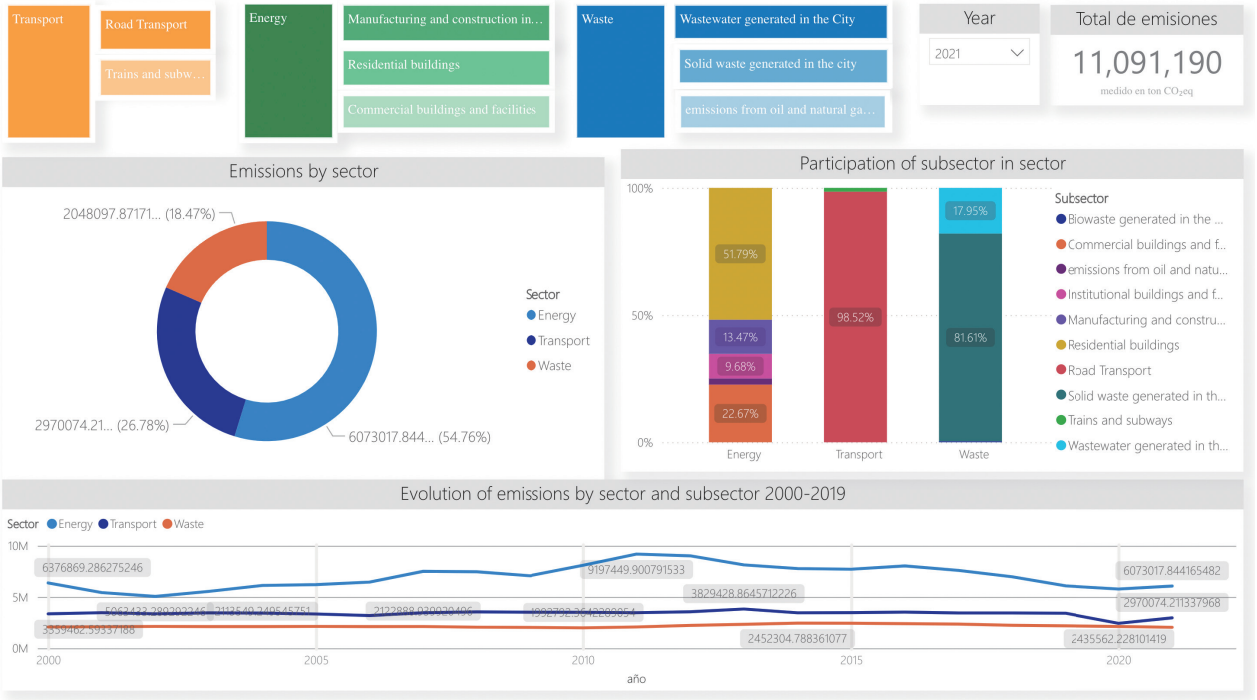
To onboard multiple stakeholders, partnership building was key in the development of the BA Climate Action platform, with core cooperation between the Buenos Aires city government and the Development Bank of Latin America. Production processes hinged around the principles of co-creation and consensus-building, initiated in partnership with Democracia en Red, an organization focused on supporting the development of innovative civic technology. Following the Project Management Body of Knowledge methodology, the co-creation approach has enabled the city to generate a platform adaptable to the specific needs of local citizens, experts and CSOs, enhancing information distribution, key resources and tailored climate strategies.

The first phase centred on exploratory research to acquire insights and ideas from experts. As part of an "ideathon" on innovative federal cities in times of COVID-19, the city government conducted in-depth interviews with 15 activists, NGO representatives and government policymakers, with questions directed to gain understanding on priority climate action sub-topics, relevant data points that were currently lacking and ideas to motivate behavioural change at the individual level. Interview findings acquired a range of recommendations, highlighting a demand for open data on air and water quality, waste, temperatures, transport and energy, whilst creative concepts such as a household sustainability programme, an eco-store and collaborative data collection initiatives were also suggested. In addition, interviewees recommended the integration of geo-localized data using compelling visualization, interactive maps and communication via storytelling as a discursive resource. The importance of cooperative data collection and clear indicators for the Buenos Aires Climate Action Plan 2050 that enable monitoring were also raised, whilst stressing the need for an interactive and educational platform that adopts a pedagogical approach accommodating a user-centred interface accessible to all citizens.

The second phase involved co-creation with civil society actors via a series of collaborative workshops in which youth activists were brought together with NGO representatives and specialists to discuss solutions to create citizen activation campaigns to encourage low-carbon behaviours with proposals such as incentive programmes and public commitments for sustainable lifestyles. Collaborative roundtables engaged over 600 residents who generated ideas surrounding motivations and barriers to climate actions, suggesting the need for improved recycling systems, electric vehicle infrastructure and a focus on sustainable education. In cooperation with climate NGOs, tools were then prototyped with proposals including a green points reward programme for household measures and a platform to connect neighbours for car sharing.

2. Designing open-source environmental datasets

The final phase focused on sourcing open data for inclusion in the BA Climate Action platform based on the insights gathered in previous collaborations. More than 30 environmental open datasets were published covering elements such as: greenhouse gas emissions, see Figure 8.1, and air quality; energy sources; consumption and efficiency; sustainable mobility as shown in Figure 8.2; comprehensive waste management; green employment; meteorological data;

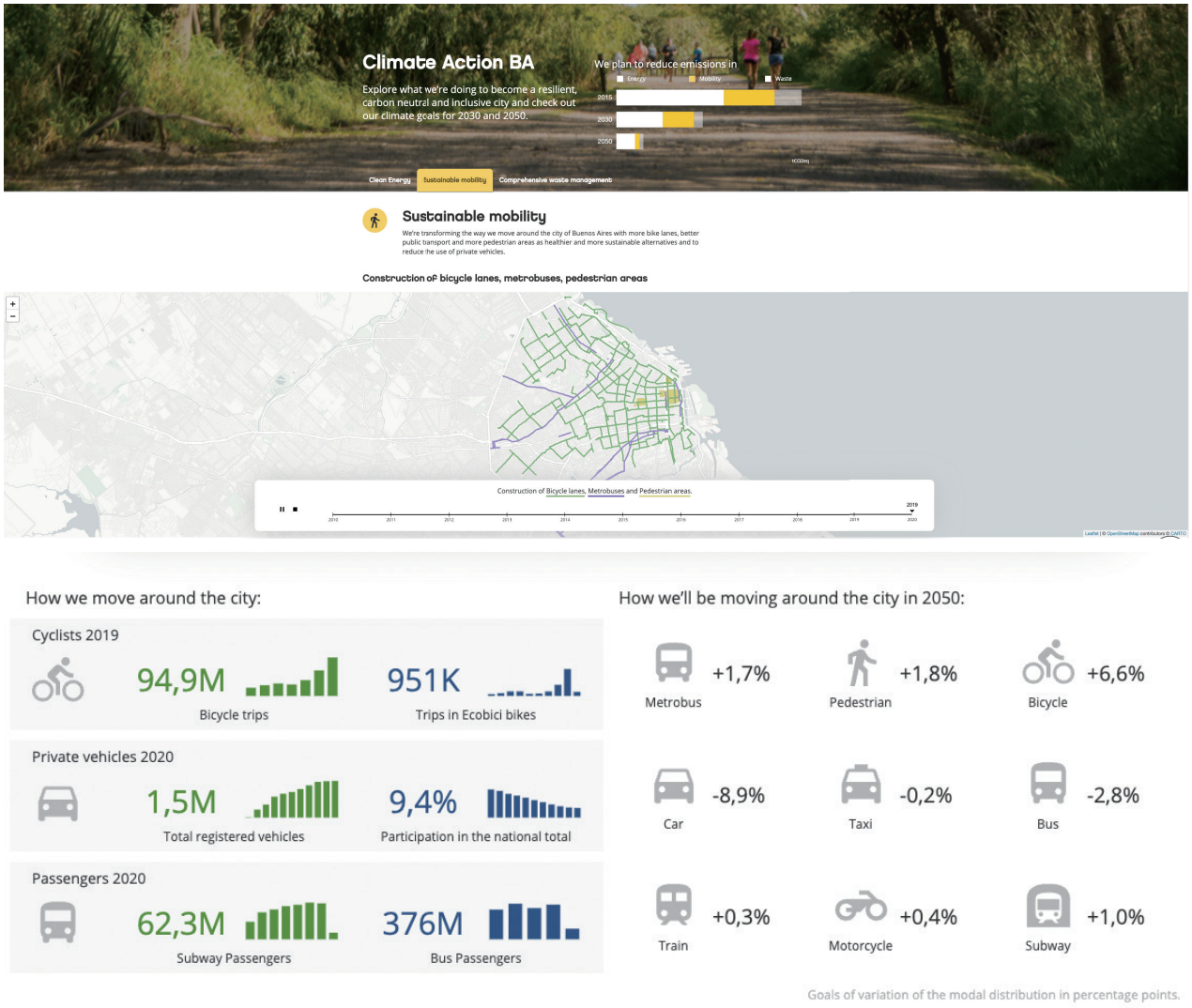


Source: Buenos Aires Ciudad. GHG Inventory. Available at: https://buenosaires.gob.ar/climateaction/ghg-inventory

Figure 8.1 The greenhouse gas emissions inventory presents data disaggregated by sector, sub-sector, source and scope as well as 2030 and 2050 emissions reduction targets

climate change adaptation and mitigations plans; emissions reduction targets; and citizen participation initiatives and proposals. To raise awareness, an open data challenge was also held inviting data visualization innovations, whilst working tables were organized as part of a hackathon in which participants designed mock-ups of impactful digital products for integration onto the platform to promote civic activation. Datasets were designed to be downloaded and used to inform new studies with interactive visualizations and participation proposals that allow users to track progress on indicators and climate goals. The platform facilitated citizen monitoring on the city's climate action and enabled the reuse of data to generate public value and evidence-based public-private decision-making. The methodology applied during the process was documented and designed to be replicated and adapted by any government in line with their respective local characteristics and requirements. Relevant agencies subsequently worked to publish quality updates for existing data, integrating machine-readable open data to maximize accessibility for the public to assess progress.

Through the integration of employment indicators that provide insight into green job distribution and gender disaggregated data on green employment opportunities for youth in the city, the platform has paved the way for Buenos Aires to develop new open government policies to accelerate the green economy transition. Data on elements such as urban gardens, eco-design and urban waste recycling that may pinpoint environmentally sustainable jobs and help to identify companies whose traditional non-environmental activities could transition towards sustainable production models are helping to facilitate this process. The platform seeks to build knowledge and learning on opportunities for green job creation, existing training needs, public promotion policies, experiences, best practices and associated lessons learned. The platform connects to the carbon footprint measurement application Your Sustainable Footprint designed by two city educational programmes: Global Citizenship and Green Schools. The application allows residents of Buenos Aires to calculate their CO_2 footprint based on big data and specific emissions calculations, fostering a more climate conscious urban population. Since the



Source: Buenos Aires Ciudad. Climate Action BA. Available at: https://buenosaires.gob.ar/climateaction

Figure 8.2 Sustainable mobility information includes time-series data on the construction of bicycle lanes, metrobuses and pedestrian areas, and projections for future mobility options in 2050

launch of the Buenos Aires Climate Action Plan 2050 in December 2020, progress across the six priority actions of trees, green spaces, bicycles and emissions, indoor efficiency, citizen preparedness and sustainable food was also made accessible on the platform.

The BA Climate Action platform incorporates the city's most forward-thinking initiatives and updates on climate action as well as proposals from various actors, thus making the cooperative work of citizens and youth as well as CSOs and the private sectors, visible. The platform has served to enrich engagement and awareness on climate change through the distribution of accessible information and dynamic visual resources, whilst devising targeted strategies aimed specifically for urban citizens to encourage their participation in climate action processes.

Reference experiences

1. Foster collaborative co-creation approaches in climate governance

The development of the BA Climate Action platform demonstrates the benefits of collaboration in the design of urban climate governance tools. By working

in cooperation with non-governmental actors, the platform showcases how municipalities can respond to demands for tailored information and citizen activation, and provide data that serves as an input to nurture an open data agenda in the future. Via a process of co-creation, cooperation between local governments, the private sector, NGOs and civil society leverages the knowledge of citizens, experts and businesses alike, producing context-specific climate data solutions and instilling equity into local climate governance. Where the inclusion of multiple stakeholders integrates diverse perspectives into the BA Climate Action platform, it can stimulate novel approaches and innovative solutions in monitoring climate change that may otherwise not emerge in a more top-down process. Considering that climate change challenges are becoming increasingly complex in urban areas, such an approach delivers key value. The iterative and flexible nature of co-creation to these tools can also strengthen their resilience and adaptability as they can evolve with changing conditions and new information. It is important to note, however, that in order to improve dialogue with citizens, it is necessary for the city government to open permanent channels of communication with the users of the platform to identify their needs and requirements while the web grows and is reformed. This allows constant transparency and accountability, favouring public trust in state institutions and making them part of climate action.

2. Promote open-data policies on local climate action

The BA Climate Action platform serves as an innovative model by which municipalities can provide dynamic public data on urban climate action. As the first city globally to integrate open governance and climate initiatives, the approach undertaken by Buenos Aires underscores the critical role of cooperation, transparency and accountability regarding data to effectively address climate change. Accessible climate action information can help to strengthen democratic integrity and augment the effectiveness of governmental operations, reflecting an innovative and groundbreaking venture for local climate governance. As a replicable tool, the platform facilitates inter-governmental knowledge transfer on climate change responses and unlocks the opportunity to extend data opening policies without the need for large-scale investments for preliminary project development phases. The open-source nature of the platform allows for users to make improvements to its development with additional functionalities, thus highlighting the advantages of building publicly accessible data tools. Through the adoption of reflexive policy frameworks, open data approaches can help municipalities accelerate climate action by enabling data-driven decision-making, monitoring real-time progress on climate goals, optimizing resource allocation, building trust and accountability on local climate governance, and increasing citizen participation and awareness on climate action. Furthermore, by making such information accessible, data transparency has the potential to facilitate greater engagement on climate action among youth. Applications working to promote sustainable behaviour at the individual level such as Your Sustainable Footprint can serve as important bridges between youth engagement and tangible climate action by providing personal climate data.

Los Angeles, United States of America
Mayor's Youth Council for Climate Action

Los Angeles formed MYCCA in 2019, unlocking a new connection between governmental leadership and youth leaders in the city. MYCCA convenes a diverse group of young Angelenos between the ages of 15 ~ 22 to: accelerate ambitious and dynamic action on climate change; raise awareness; and stimulate wider engagement among local citizens on climate solutions in cooperation with field leaders and experts. MYCCA members are offered a one-year tenure in which council meetings are hosted by the Mayor's Office of Sustainability, with sub-team meetings organized between council meetings to support work on specific projects, see Figure 8.3. To gain exposure to real world examples of ongoing sustainability initiatives, council

members also participate in off-site visits. The mayor joins at least one meeting per year to receive updates, and actively involves youth climate leaders in city-level decision-making on local climate commitments.

The council invites leaders from the city government, environmental NGOs and local businesses to participate in council meetings to broaden engagement. To inspire youth and communities to take meaningful climate action, MYCCA established the LA Climate Stories Initiative which harnesses storytelling to augment awareness on the magnitude of climate change impacts on local communities, as well as the potential for people to take responsive action. The council therefore plays a pivotal role in interconnecting a diverse collection of youth across the city, encouraging knowledge transfer and shared experiences whilst facilitating partnership building to generate a core platform from which young generations can drive climate action in the city.

Source: Maker Faire. Los Angeles Mayor's Youth Council For Climate Action. Available at: https://makerfaire.com/yearbook/2023-projects/los-angeles-mayors-youth-council-for-climate-action/

Figure 8.3 Members of the MYCCA

Lima, Peru
Lima Youth Action: enhancing youth participation in local governance

Case background

With a notably younger demographic, Peru has a substantial proportion of young citizens with individuals between the ages of 15 ~ 19 constituting a quarter of the national population according to the National Youth Secretariat[1]. As the national capital with a population of around 10 million[2], the metropolitan municipality of Lima is one of the largest cities in Latin America and accounts for approximately one-third of these young people (2,201,239)[3]. Participation of young people in local governance has been essentially non-existent, an issue that was identified in 2019 during which only two urban youth organizations were acknowledged in the city – both holding only voluntary capacities.

To expand the rights of young urban citizens in regard to political and citizen participation, foster greater dialogue and provide them with opportunities to become proactive and engaged in local government decision-making, the city established the Lima Joven Acciona (Action of Youth in Lima) programme in January 2019. Recognizing young people as strategic urban actors, it set out to bridge the gap between youth and the municipal government to instil inclusive and equitable decision-making processes in local governance. The programme covers four strategic action pillars focusing on: an education strategy; an empowerment strategy; a social action strategy; and a strategy for the creation and initialization of participatory spaces. Leveraging education as a key transformative tool, it set out to strengthen the capacity of young people by facilitating leadership training schools and providing greater support for youth organizations and youth public speaking. It aimed to better position young people to effectively formulate and convey urban and community challenges and create responsive solutions. To enhance their participation in practical urban action, it worked to prioritize their participation in municipal programmes in partnership with the city government and strategic allies, and also to create youth-oriented participatory and institutional spaces to ensure that their actions in local processes are supported by formalized normative documents such as management resolutions and municipal ordinances.

Implementation process

1. Establishing institutional spaces for youth participation

Lima Joven Acciona not only sought to create welfare activities for young people but also to increase the capacity for their action and agency in municipal development, providing them with the standing to serve as key facilitators in transformational urban projects and programmes. As a core framework from which to establish new models for working with younger citizens, the city adopted a three-pronged approach centred on the principles of intergenerational dynamics, full participation and interdisciplinary action. To apply a generational approach, actions were planned and executed recognizing young people as agents of social change, able to solve urban challenges not only for youth but also wider community populations. The programme also established a number of strategic alliances to allow for the development of activities under the framework including: different communities within the city; social organizations; independent professionals who provided expertise and commitment across training sessions and workshops; as well as civil associations, NGOs and universities who provided capacity for activities such as debate tournaments and youth meetings.

The programme created four specialized institutional

1 Medium. Young people in Bicentennial Peru. Available at: https://pnudperu.medium.com/young-people-in-bicentennial-peru-e6e5e7e8aa59. Aug 12, 2021.

2 The World Bank. Improving lives in Lima, one intersection at a time. Available at: https://blogs.worldbank.org/en/transport/improving-lives-lima-one-intersection-time#:~:text=With%20an%20estimated%20population%20of,biggest%20cities%20in%20Latin%20America. August 21, 2023.

3 Municipality of Lima. Available at: https://redmetro.gpvlima.com/public/estadisticas-organizaciones.

spaces that have allowed youth in Lima to actively participate in local governance processes. Firstly, the Network of Young Leaders of Metropolitan Lima was developed to promote the joint work of unorganized youth to bolster their leadership capacities and offer support to their communities. Secondly, the Metropolitan Network for Youth Organizations marked the first virtual platform in the city designed solely for youth organizations to provide visibility and generate work networks among youth organizations, public and private institutions, and citizens. The objectives of the network included preparing documents and publications on organized youth participation. Between May and June 2020, the Metropolitan Network for Youth Organizations ran a social change essay contest inviting young people to write about youth participation.

The third institutional space is the Youth Participation District Council of Lima Cercado, established as a forum for youth representation within the district. It is comprised of 13 local youth organizations who were invited to design and formulate projects and solutions for community challenges, facilitating their participation in development processes. And the fourth space is the reactivated Metropolitan System for the Promotion and Management of Youth Policies. Established in 2002 to provide a space to streamline coordination between young people and public and private institutions in order to promote the design, management and evaluation of youth policy and initiatives in the city, the reactivation process was initiated following the application of Mayor's Resolution No. 228 dated 13 February 2019. The resolution led to a number of positive impacts including improved coordination regarding annual work plan actions across the three associated bodies of Lima's Metropolitan System: (1) the Metropolitan Committee on Youth Policies; (2) the Metropolitan Coordinator of Municipal Youth Programmes; and (3) the Metropolitan Council on Youth Participation – made up of representatives from over 20 youth organizations. This was reflected in improved work plan execution of which 79 percent were delivered between the three bodies in 2019, and 86 percent in the first quarter of 2020[1]. The process also accelerated wider engagement on the Metropolitan Coordinator of Municipal Youth Programmes at the metropolitan-level with 31 independent districts involved, and 31 public and private institutions working on youth issues as part of the Metropolitan Committee on Youth Policy. As of 2020, 23 youth meetings had been held throughout the city to gather proposals for a variety of urban challenges, with 86 youth organizations part of the consultation and decision-making processes[1].

2. Formulating the metropolitan youth strategy

The Metropolitan Youth Strategy was developed under the Metropolitan System for the Promotion and Management of Youth Policies as an inclusive technical instrument to guide the articulation of initiatives and proposals to generate spaces for youth participation, see Figure 8.4. It serves as a cohesive framework to improve the quality of life for urban youth and ensure their voices are accounted for in local planning. The strategy prioritizes eight thematic areas based on the foundations of Peru's National Bicentennial Plan guidelines, National Youth Policy and the SDGs at the global level: (1) health and healthy lifestyles; (2) employability and entrepreneurship; (3) access to quality education; (4) peace and violence prevention; (5) environment sustainability and conservation; (6) citizen participation, associationism and governance; (7) social creation and innovation; and (8) culture and identity. As core axes, they channel local service delivery and programme development in line with the objectives prioritized by the National Youth Policy. As of 2020, more than 1,400 young people had participated in the design of the strategy, proposing solutions across all areas[1]. Young people were then able to cooperate with local governments to effectively implement the National Youth Policy at the territorial level, impacting 42 of Lima's independent districts. By binding youth policy into regulation, this has presented young people with opportunities to build governance and leadership skills, and initiative urban projects through active participation in municipal programmes and social interventions.

1 Municipality of Lima. Available at: https://redmetro.gpvlima.com/public/estadisticas-organizaciones.

Source: International Observatory on Participatory Democracy. Available at: https://oidp.net/distinction/en/candidacy.php?id=1280

Figure 8.4 Young citizens propose urban solutions as part of Lima's Metropolitan Youth Strategy

3. Integrating mechanisms for evaluation and accountability

To generate quarterly progress reports on Lima Joven Acciona, a matrix of general indicators was developed to monitor progress on objectives. A number of core indicators were measured including: the number of youth members trained in leadership and public speaking processes; the number of youth organizations; the number of community projects that were designed and implemented by organized and unorganized young people; the number of residents benefitting from community and social interventions; the number of institutional spaces for youth participation; and the number of public and private institutions. In addition, more specific indicators were designed to produce disaggregated information, such as the number of young people by gender, district of residence, educational level attainted, occupation and school. This information enabled the standardization of different activity databases and helped to evaluate the scope of activities. With regard to youth organizations, indicators also referred to thematic areas of interest, districts of incidence and the existence of an institutional registry. Qualitative tools were developed including feedback meetings, forms with open-ended questions, the "Most Significant Change" tool as well as interviews with young programme participants.

As of 2020, Lima Joven Acciona had trained 3,000 young people in areas of leadership, organization and public speaking, involved 2,253 young people in dialogue and debate, cemented 56 strategic alliances with public and private institutions to accelerate progress on objectives, and promoted the design and implementation of 108 community and social projects with young people, see Figure 8.5[1]. Where the city currently accommodates 321 active urban youth organizations and 3,040 youth members[2], the programme has played a crucial role in catalysing the transformation of youth engagement in urban governance with renewed recognition as to their key role in addressing contemporary and complex urban challenges. Children and youth were actively involved in knowledge exchange processes for the preparation of

1 International Observatory on Participatory Democracy. Available at: https://oidp.net/distinction/en/record01.2021.php.

2 Municipality of Lima. Available at: https://redmetro.gpvlima.com/public/estadisticas-organizaciones.

Source: Lima Joven @lime_joven X page. Available at: https://x.com/lima_joven/status/1550215581739122691/photo/1

Figure 8.5 Through Lima Joven Acciona, Alfonso Ugarte school students plant seedlings for a bio-garden as part of the Youth for Ecosystems programme in Santa Anita, Lima

Local Plan for Climate Change of the Province of Lima 2021—2030, which was developed between 2019—2020, laying out a comprehensive climate strategy for the 43 districts of the metropolitan territory.

Reference experiences

1. Recognize the importance of building dedicated institutional environments to aid youth integration into municipal governance

Lima Joven Acciona represents an exemplary model for municipalities to integrate young citizens into local governance via institutional transformation. By adopting a multi-faceted and structured approach, the initiative capitalized on traditional participatory spaces such as municipal councils and assemblies, where the development of dedicated institutional youth spaces has helped to transform young people from passive recipients to active contributors in municipal development. The production of these spaces has enabled the city to better address the unique needs of young people, facilitating skills building in key areas such as leadership and capacity building, and encouraging their participation in civic life. The programme has therefore worked to revitalize youth inclusion and eliminate their historical marginalization in Lima's municipal development processes, forging closer ties between young people, the public and private sectors, and academia, ultimately fostering a more equitable urban governance system. Critically, cities can invest in their future development by cultivating an enabling environment for youth participation, where empowered and well-supported young people are more likely to become productive and engaged in municipal activities, and thus drive equitable and prosperous urban development.

2. Support institutional mechanisms with tailored policy for youth participation

Urban policy on youth involvement in municipal processes is pivotal to creating vibrant, inclusive and forward-thinking cities. Recognizing young people as core urban actors, Lima Joven Acciona highlights the importance of supporting institutional mechanisms for youth integration into local governance with targeted youth policy. The development of the Metropolitan Youth Strategy has ensured that young people have formal avenues to participate, whilst also validating their role in municipal development. The reactivation and formalization of the Metropolitan System for the Promotion and Management of Youth Policies has also helped to ensure that youth participation is embedded in the metropolitan governance structure, streamlining efforts across different local bodies and institutions. Such policy design not only empowers young urban citizens, but also fosters a sense of ownership and responsibility towards their communities. Accordingly, the programme shows how cities can adopt structured youth policy frameworks to ensure that their involvement is not just symbolic but has tangible impact, promoting increased youth engagement in urban development.

Mombasa, Kenya
Youth-led mangrove ecosystem resilience and climate adaptation in coastal urban communities

Case background

COP26 highlighted that even a 2 percent rise in sea level could pose a risk of urban flooding. Mangroves are a crucial component of coastal ecosystems providing habitats for various species and protecting shorelines from erosion and storm surges. Despite covering just 0.1 percent of the Earth's surface, mangroves store up to 10 times more carbon per hectare than terrestrial forests[1]. Mangrove forests store more carbon per unit area than any other ecosystem on Earth. This carbon-storing superpower makes mangroves a key part of the solution to climate change.

In Mombasa, Kenya's second-largest city with a population exceeding one million, the coastal communities are facing significant threats from mangrove degradation, urban expansion and climate change. Tudor Creek is located to the north-west of Mombasa Island, separating the city of Mombasa from the mainland. It borders five of Mombasa county's six administrative units and flows through low-income villages whose communities are struggling with poverty and poor waste management. It is home to mangroves, but due to overexploitation, infrastructure development and land encroachment, the area of mangroves has been continuously decreasing. Over the past 30 years, drainage, logging and pollution have further deteriorated the health of the mangroves and exacerbated the degradation of the marine ecosystem. Tudor Creek has been listed as one of the most severely degraded peri-urban mangrove ecosystems in Kenya[2]. According to the vegetation coverage change data, between 1992 and 2009, Tudor Forest had lost 86.9 percent of its area implying an annual degradation rate of 5.1 percent, see Figure 8.6, far exceeding the global average of 1 ~ 2 percent[3]. The coastal communities adjacent to the mangrove ecosystem—mostly impoverished and marginalized youth and women—are directly affected and struggling to sustain their livelihoods. Furthermore, the potential for ecotourism in the suburban ecosystem of Tudor Creek has not been fully realized due to environmental degradation, limiting local economic development opportunities.

Given the intrinsic value of mangroves and their

Source: National Mangrove Ecosystem Management Plan Final. 170628 – DocsLib. [EB/OL]. Available at: https://docslib.org/doc/3655326/national-mangrove-ecosystem-management-plan-final-170628

Figure 8.6 Change in mangrove forest cover in Tudor Creek from 1992 to 2009

1 Conservation International. Share the Facts About Mangroves. [EB/OL]. Available at: https://www.conservation.org/act/share-the-facts-about-mangroves.

2 Diana Anyoso (Big Ship) and Peter Bulimo. MIKOKO ENDELEVU: TIBA YA TABIA NCHI. [EB/OL]. Available at: https://www.youth4nature.org/blog/mkokoendelevu, August 18, 2023.

3 BOSIRE J O, KAINO J J, OLAGOKE A O, et al. Mangroves in peril: unprecedented degradation rates of peri-urban mangroves in Kenya [J]. Biogeosciences, 2014, 11: 2, 623–2,634.

importance in combating climate change, Kenyan authorities banned the use of mangroves for construction in 1997. Although this curbed the open trading of mangrove timber, the forests remain under pressure from people struggling to make a living, cutting trees down to make "changaa" and charcoal[1]. It is crucial for all communities, and especially the youth, to recognize the urgent need to protect coastal forests.

Despite the common social, economic and political barriers to youth development, young people can play a critical role in addressing climate change. The Big Ship Environmental Organization or Big Ship Community-Based Organization (Big Ship), was founded in 2009 and is led by youth. Combining local ecological conditions, they adopt unique engagement strategies and working methods to promote community involvement in actions that integrate economic development, natural resource conservation and climate adaptation. The organization focuses on implementing nature-based solutions through socioeconomic and environmental innovation projects to address environmental degradation and poverty in urban mangrove-adjacent communities, with a particular focus on youth and women. They have undertaken significant work on mangrove ecosystem protection and restoration, waste material recovery, community empowerment, and education and training. Their projects and operations cover an area of 5 km from the shores of Tudor Creek[2].

Implementation process

Big Ship's community practices have been ongoing for over a decade, restoring 200 hectares (494 acres) of mangroves along the Tudor Creek coastline by planting more than 300,000 mangrove seedlings with a survival rate of up to 95 percent[3]. They have also established a nursery with 200,000 managed seedlings, collaborated with 58 partners, set up 65 adoption sites, created employment connections for 500 individuals and benefited 120 participants through their Volunteering, Internship and Mentorship Programme[4].

In practice, Big Ship has innovatively implemented a restorative project model called Adopt A Site[5] aimed at promoting community development through tree planting. This model seeks partners from the public and private sectors to invest in increasing forest cover and promoting decent jobs and economic growth. The model employs a four-phase approach to facilitate sustainable restoration: (1) Conducting Geographic Information System (GIS) for analysis and restoration planning of degraded sites; (2) Establishing community partnership; (3) Promoting ecological restoration and effectiveness evaluation; and (4) Focusing on socioeconomic development.

1. GIS analysis and restoration planning for degraded areas

Big Ship collaborates with the Kenya Forest Service, local community organizations and Environmental and Biosystems Engineering Students Association at the University of Nairobi to identify the most suitable areas for mangrove planting and conducting comprehensive analyses of existing mangrove species and the surrounding environment. By integrating field surveys, satellite imagery and drone technology, they precisely pinpoint the specific locations and extents of degraded areas, see Figure 8.7. This thorough analysis of soil, water quality and vegetation coverage provides a solid foundation for the subsequent restoration work. Additionally, they use GIS technology to map these degraded areas and develop restoration plans that include scientific planting schemes and long-term monitoring and maintenance strategies.

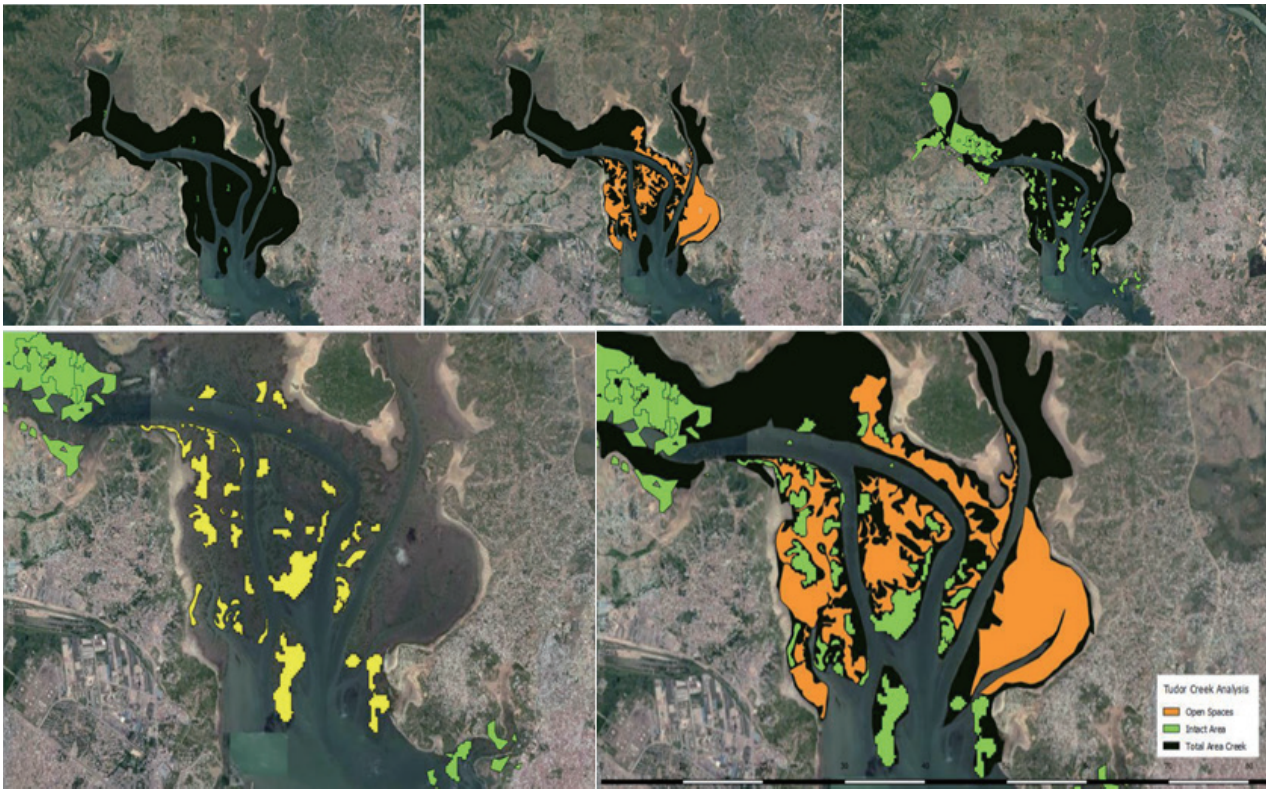
1 Kang-Chun Cheng. Mongabay Environmental News. Mangrove conservation takes root with local communities on Kenya's coast [EB/OL]. Available at: https://news.mongabay.com/2021/10/mangrove-conservation-takes-root-with-local-communities-on-kenyas-coast/. 22 October 2021.

2 EPTF. Big Ship: A Reclamation Story. [EB/OL]. Available at: https://eptf.org/big-ship-a-reclamation-story/. December 6, 2021.

3 Inhabitat. Big Ship's solutions for a flourishing Kenyan coastline. [EB/OL]. Available at: https://inhabitat.com/big-ships-solutions-for-a-flourishing-kenyan-coastline/.

4 Big Ship, [EB/OL]. Programs. Available at: https://bigship.org/programs/.

5 Department of Environmental & Biosystems Engineering. Mangrove Restoration through Adopt-A-Site Program (UoN and Big Ship C.B.O). [EB/OL]. Available at: https://ebe.uonbi.ac.ke/index.php/latest-news/mangrove-restoration-through-adopt-site-program-uon-and-big-ship-cbo.



Source: Big Ship. [EB/OL]. Programs. Available at: https://bigship.org/programs/

Figure 8.7 GIS analysis results of the Tudor Creek basin (including total area, degraded area and canopy coverage area)

2. Establishing community partnership

Big Ship adheres to the philosophy that mangroves belong to the community and so implements a community-centred strategy to ensure that it is not just a beneficiary but also an active participant and decision maker[1]. The specific measures include:

(1) Community mobilization and communication. By holding community meetings, organizing lectures and conducting publicity activities, the project raises awareness among community members about the importance of mangrove conservation and enhances their environmental consciousness. Through distributing promotional materials and educational videos, more people are encouraged to participate in mangrove conservation. On environmental commemorative days such as World Mangrove Day, Big Ship often collaborates with organizations including the Aga Khan Foundation (AKF) to host events that raise public awareness about the importance of mangrove conservation.

(2) Training and empowerment. Big Ship's Volunteering, Internship and Mentorship Programme provides a platform where professionals in various fields can interact and learn, see Figure 8.8. As a partner of AKF's Green Champions Programme, Big Ship collaborates with youth and unemployed technicians to offer training in mangrove planting, environmental management, financial literacy and entrepreneurial skills, thereby empowering the community and broadening employment opportunities. It also works

1 Aga Khan Foundation. The mangrove forest belongs to the community: Working with nature to protect livelihoods and boost climate resilience. [EB/OL]. Available at: https://www.akf.org.uk/the-mangrove-forest-belongs-to-the-community-working-with-nature-to-protect-livelihoods-and-boost-climate-resilience/. 26 July 2023.

Source: Diana Anyoso (Big Ship) and Peter Bulimo. MIKOKO ENDELEVU: TIBA YA TABIA NCHI. [EB/OL]. Available at: https://www.youth4nature.org/blog/mkokoendelevu, August 18th, 2023

Figure 8.8 Information and knowledge-sharing meeting between the Inuka[1] team, Big Ship and community members

with non-profit organizations such as the Navigators Economic Projects Transformational Facility (EPTF)[2] Kenya Trust to provide youth and women with entrepreneurship skills, financial literacy and business mentorship, in line with their goals in development of low-carbon value chains[3].

(3) Establishing collaborative mechanisms. The project establishes community cooperative organizations and formulates cooperation rules and management methods to ensure that each community member has a clear role and responsibility in the project. For instance, community forest associations are responsible for cultivating and planting mangrove seedlings, while scouts oversee and manage mangrove restoration work.

3. Promoting ecological restoration and conducting effectiveness evaluations

Big Ship selects species suitable for the local environment, such as the red mangrove *Rhizophora mucronata* which is fast growing and good for soil formation, the orange *mangrove Bruguiera gymnorrhiza* which attracts bees and helps in apiculture, and the yellow mangrove Ceriops tagal which has strong adaptability to very harsh substrates. These species

1 "Inuka" is the name of a restoration project set up for youth and carried out by youth which was launched by the Youth4Nature organization in Nairobi, Kenya in March 2023. "Inuka" means "rise up" in Swahili.

2 EPTF. Available at: https://eptf.org/.

3 EPTF. Big Ship: A Reclamation Story. [EB/OL]. Available at: https://eptf.org/big-ship-a-reclamation-story/. December 6th, 2021.

can reproduce asexually and their seeds are easier to propagate on a large scale, aiding the restoration of the mangrove ecosystem[1]. During planting, community members first cultivate seedlings in nurseries and then transplant healthy seedlings to designated degraded areas. Planting activities include not only embedding seedlings into the soil but also the subsequent watering, fertilizing and pest control. Each planting activity is conducted as a community collective event, enhancing cohesion and increasing the project's success rate. Youth handle the planting work, while older individuals provide information on the historical growth conditions and best planting seasons.

Innovatively, the project uses recycled plastic yogurt containers instead of disposable polyethylene bags to plant mangrove seedlings, as shown in Figure 8.9. Through the Resource Collection Project, 10,000 plastic yogurt containers are collected annually, reducing plastic waste at the main dumpsite by 60 percent[2]. This initiative also improves the success rate of seedling planting.

By combining on-site evaluations, GIS technology and community knowledge, the project regularly monitors the growth of mangroves in the planting areas. Regular monitoring occurs at 3, 6 and 18 months to ensure a 100 percent success rate. Monitoring activities include measuring seedling growth height, checking for pests and diseases, and assessing soil and water quality. Community resource management members from Beach Management Units are trained to regularly patrol and document the planting areas, ensuring healthy growth[3].

Source: Bigship. About. [EB/OL]. Available at: https://bigship.org/about/

Figure 8.9 Transplanting mangrove seedlings

4. Focusing on socioeconomic development

In the fourth phase of the project, Big Ship focuses on socioeconomic development, aiming to achieve sustainable protection of the mangrove ecosystem and comprehensive prosperity for the community through integrated economic empowerment and social development plans. For example, training community members to become professional guides explaining the value of mangroves to tourists, broadens the community's income channels while enhancing public environmental awareness. Developing mangrove honey businesses, promoting aquaculture and leveraging natural resource advantages bring additional economic benefits, helping to protect mangroves from deforestation. Big Ship also employs community members in the planting, supervision and management of mangroves, ensuring their healthy growth while providing job opportunities. Big Ship purchases mangrove seedlings cultivated by community members, contributing to a more stable income, and offers financial literacy training to help community members manage income and investments, thus laying a solid foundation for future community development.

In terms of market expansion, Big Ship establishes partnerships with both the public and private sectors, and works with enterprises to attract more investment and support, thereby expanding the project's impact

1 Diana Anyoso (Big Ship) and Peter Bulimo. MIKOKO ENDELEVU: TIBA YA TABIA NCHI. [EB/OL]. Available at: https://www.youth4nature.org/blog/mkokoendelevu, August 18th, 2023.

2 Inhabitat. Big Ship's solutions for a flourishing Kenyan coastline. [EB/OL]//Inhabitat – Green Design, Innovation, Architecture, Green Building | Green design & innovation for a better world. (2022-06-24)[2024-07-09]. Available at: https://inhabitat.com/big-ships-solutions-for-a-flourishing-kenyan-coastline/.

3 Diana Anyoso (Big Ship) and Peter Bulimo. MIKOKO ENDELEVU: TIBA YA TABIA NCHI. [EB/OL]. Available at: https://www.youth4nature.org/blog/mkokoendelevu, August 18, 2023.

and sustainability. During market expansion, Big Ship attracts more enterprises by offering branding and corporate social responsibility opportunities to its partners. Big Ship actively participates in various environmental and sustainable development forums, sharing project outcomes and expanding its influence.

When formulating its long-term socioeconomic development plans, Big Ship implements multiple projects based on community needs and provides training in crafts, agriculture, marketing and more to diversify its income sources. This ultimately achieves the community's economic independence and sustainable development, creating a positive cycle with mangrove ecosystem protection. Through in-depth communication with community members, emphasizing community participation and demand orientation, formulating practical project plans, and through continuous evaluation and improvement, the project is ensured to deliver long-term benefits to the communities.

Reference experiences

The experience of youth-led mangrove ecosystem resilience and climate adaptation actions in the coastal communities of Mombasa demonstrates the capabilities of youth in community mobilization, resource integration and environmental protection. This experience can be widely applied and promoted to mangrove protection and climate adaptation actions in many coastal urban areas worldwide, providing practical references for solutions and implementation processes in similar communities.

1. Leveraging youth leadership

The innovative leadership of youth in urban ecological environment protection, climate action and community development should be harnessed, and youth community organizations or volunteer teams with diverse skills and focused areas of interest should be cultivated. Youth should be encouraged to root themselves in local communities and engage in sustainable practices, and empowered with clear roles and responsibilities in order to enhance the overall effectiveness of the project and sustainability in economic, social, environmental, cultural and governance aspects. Tailored professional training programmes should be used to conduct educational training on environmental resource management and protection, and international exchange and cooperation, allowing youth volunteers to become bridges connecting communities with ecosystem resilience and climate adaptation actions. Youth should fully utilize social media and various promotional platforms to advocate for the importance of maintaining ecosystem resilience and climate adaptability, becoming pioneers in environmental advocacy while also improving their future governance capabilities.

2.Utilizing youth professional potential

In the youth-led mangrove ecosystem resilience and climate adaptation actions in the coastal communities of Mombasa city, youth not only participate in field surveys but also operate drones and analyse satellite imagery to accurately identify the specific locations and extent of degraded areas. By participating in periodic evaluations and feedback at various stages of the project, they provide improvement suggestions to the project team, ensuring the continuous optimization and effective implementation of the project. Youth should be trained to quickly master advanced ecological monitoring technologies and participate in ecological data collection and analysis, thereby providing a scientific basis for ecological restoration and helping the team to adjust its strategies.

3. Enhancing community mobilization and participation

Community-centred development is key to the success of Big Ship. Strengthening community mobilization and communication, guiding community members to participate in the investigation and survey of the current status of mangroves, reducing coastal forest deforestation, effectively restoring mangrove forest area, and enhancing ecological protection efficiency through youth-led efforts is crucial for the long-term restoration of mangrove ecosystem resilience. This approach addresses climate adaptation issues and socioeconomic problems while protecting regional culture. In this process, youth organize and participate in community meetings, lectures and promotional activities, not only raising community awareness of ecological protection but also developing more diverse forms of activities through creativity and enthusiasm to enhance community participation, stimulate innovation vitality, and improve community members' capabilities

and cohesion. Community supervision mechanisms can be further established to ensure the project's long-term sustainability.

4. Achieving economic empowerment and market expansion

The key to the sustainability of Big Ship lies in enabling local low-income communities to share in the economic benefits of protecting and restoring the mangrove ecosystem. This helps impoverished and marginalized groups to gain income and elevate their status, driving the community towards a more equitable and inclusive future. Sustainable economic development can prevent communities from damaging the environment due to livelihood pressures. New income sources and job opportunities should be created to strengthen the community's economic power by advancing various community economic empowerment initiatives, including paid guiding services, mangrove honey businesses, aquaculture and selling seedlings through community forest associations. Additionally, focusing on the participation of youth and women by providing entrepreneurial skills support, financial literacy training and business guidance can enhance their financial management and operational capabilities, laying a solid foundation for the community's long-term development.

Policy suggestions

1. Support youth as leaders in development strategies for urban ecological resilience and environmental resource management

Break the constraints of youth marginalization, unleash their transformative potential, and empower and support their participation and leadership at all levels so as to fully utilize their contributions to global ecological and climate challenges. Leverage the crucial role of youth-led NGOs in guiding the public to adopt correct environmental behaviours and raising people's enthusiasm for conservation activities. Emphasize community-based youth participation by providing technical training and network support for youth and community residents in order to increase employment opportunities and income sources for youth and women. Promote a community governance system involving multiple groups such as youth, children and women to foster their sense of responsibility and public participation awareness. Encourage youth to utilize their professional potential, implement innovative solutions and build community mechanisms for ecological monitoring, feedback, decision-making and supervision, thereby promoting the popularization and education of ecosystem resilience and climate adaptation technologies at the community level. Highlight youth leadership and encourage the participation of residents, enterprises and organizations in the development and management of community natural resources, forming a virtuous cycle of resource utilization and protection which ensures that benefits are given back to the community. This will enhance local communities' self-development capability and strengthen their contributions to urban ecosystem resilience and climate response.

2. Cultivate youth-oriented urban governance platforms

Cities and communities are encouraged to establish and enhance youth-friendly governance platforms to actively involve young people in climate action and sustainable development efforts. These platforms should include mechanisms such as youth councils, participatory budgeting, public forums and youth ambassador programmes, so as to provide formal channels for youth to engage in decision-making and ensure their voices are heard and addressed in local policymaking. By setting up youth advisory committees and specialized working groups, city managers can regularly consult with young people to know about their concerns and suggestions. Additionally, to deepen and broaden youth participation, these platforms should organize regular climate action workshops and simulation camps to enable youth to learn and practice decision-making in realistic scenarios. Introducing youth mentorship programmes where experienced policymakers and industry experts offer one-on-one guidance can help young people better understand and engage in urban governance. The platforms should also establish a feedback mechanism to regularly assess the effectiveness of youth participation, and adjust and optimize participation channels and tools to ensure diverse youth groups are fairly represented in

the policymaking process, so as to encourage greater youth involvement.

3. Ramp up support for youth-led ecological and economic empowerment projects

Youth-led ecological restoration and economic empowerment projects should be encouraged and supported through community mobilization and multi-stakeholder collaboration to foster youth leadership in urban and community sustainable development. These projects should encompass areas such as environmental protection, ecological restoration and green economic development to help youth gain practical experience in local resource management and environmental conservation. They should also provide necessary funding and technical support, such as micro-grant programmes, green entrepreneurship awards and business incubators, to help youth innovate and execute their ecological initiatives. Additionally, collaboration with private enterprises, NGOs and academic institutions can provide youth with internships and career development opportunities to further enhance their professional skills and employment prospects. Youth support networks where experienced project leaders share their insights and lessons learned should also be developed to help new initiatives succeed more quickly. All these efforts will not only help youth with job opportunities and to gain financial support, but will also strengthen their sense of responsibility and belonging to their communities and the environment, promoting the communities' long-term sustainable development. Cities and communities should also establish youth scholarships and research funds to support academic research and innovative projects related to sustainable development and ecological conservation.

4. Promote open data policies to aid data transparency and youth participation in local action

Open data policies can enhance the transparency of environmental and climate change information, thereby motivating broader youth engagement in climate action and decision-making processes. By establishing open environmental data platforms, cities can provide youth with direct access to and use of environmental data, such as air quality, greenhouse gas emissions and energy consumption, to promote evidence-based public participation and decision-making. Additionally, cities should develop applications and tools (e.g., carbon footprint calculators, environmental monitoring devices, virtual reality environmental education tools) through collaboration to enable youth to easily understand and engage in environmental protection activities. Data hackathons and innovation competitions can also be hosted to further inspire youth to develop new data visualization tools and decision-support systems so as to enhance public awareness and action on climate change and environmental issues. Cities should establish communities of open data users to support joint discussion and data analysis between youth and experts to explore innovative environmental solutions. These open policies not only increase transparency and accountability but also promote deeper youth participation and innovation in climate governance, driving the development of more inclusive and forward-thinking environmental policies, and enhancing the resilience and adaptability of cities and communities in responding to climate change.

Chapter 9

Technological and digital innovation for youth-led urban climate action

Introduction[1]

As cities worldwide brace to combat increasingly complex climate impacts, technological and digital innovation presents a pivotal opportunity to accelerate the delivery of impactful urban solutions at the local level. The rapid advancement in technological and digital innovation is fuelling a new paradigm in how urban societies can address converging climate challenges, providing young people, in particular, with new opportunities to learn about climate impacts, develop novel solutions across sectors and safeguard urban areas. The emergence of smart city technologies and urban digital transformations are reconfiguring cities, enabling younger generations to develop and trial new innovations that can rally a collective effort to correct course on the climate agenda and pivot urban development trajectories to ensure more prosperous futures. When integrated into urban planning and management, technological applications have the capacity to enhance urban safety and governance, and improve the sustainability and resilience of the built environment. Consequently, these tools afford cities a multitude of benefits in light of climate change, from improved meteorological data access for enhanced preparedness to the ability to crowdsource information on negative urban hotpots for the timely resolution of challenges such as natural disasters. In parallel, digital solutions can improve the delivery of key urban services, reduce resource consumption and enhance the quality of urban life by facilitating responsive development in the face of climate change.

With the distinct advantage of growing up under the ubiquitous influence of digital technologies, young people are at the forefront of digital innovation and possess immense capacity to catalyse urban transformation through technological solutions. Enabling the realization of new and dynamic tools for urban development actors, technology and digital innovation therefore play a substantial role in empowering youth in local climate action processes. This chapter critically interrogates the potential of these assets as tools to drive youth-led climate action in urban areas. It analyses the opportunities and capabilities that emerging green and smart city digital technologies present for cities in regard to generating climate change solutions and catalysing climate resilient urban transformations. In addition, it explores the key role of education, training and entrepreneurship in enabling young people to effectively integrate into green industries and capitalize on emerging technological and digital innovations. To conclude, the chapter highlights the potential for digital platforms and networks to strengthen collective climate action and connect youth with municipal actors to mobilize and empower them in local climate action processes.

Harnessing smart digital and green technologies to drive urban climate action

The role of smart digital technologies in achieving climate-conscious cities

Digital trends and emerging technologies are playing a substantial role in 21st century urbanization with a marked impact on the implementation of climate change strategies and the management of ecological systems within urban areas. As hubs of innovation, climate-smart digital tools are frequently being developed, tested and scaled up in cities, in which there is a growing integration of digital technologies into strategic urban development methodologies such as scenario planning, foresight and resilience benchmarking to help optimize urban functionality under changing environmental conditions. As cities grapple with increasingly pronounced and more frequent extreme weather such as heatwaves and

1 This chapter was written by UN-Habitat.

floods, cutting-edge digital technologies, data analytics and increasingly sophisticated climate modelling help to identify vulnerability hotspots, establish early warning systems and implement enhanced risk-reduction measures as part of urban climate change adaptation plans, while smart technologies also help to optimize energy and resources to advance climate change mitigation efforts. This is especially pertinent considering that climate-related risks impact urban communities disproportionality, and children are among the most vulnerable. Consequently, when planned and integrated properly, smart digital technologies play a key role in curbing, halting and reversing climate change – driving climate-resilient urbanization. Youth play an integral role in leveraging the catalytic potential offered by new technologies and innovations, allowing cities to rethink urban systems and development strategies. Accordingly, cities capitalize on this potential, encouraging youth participation in climate innovation ecosystems.

The generation of high-quality data is imperative for cities in order to make informed decisions, deliver tailored climate solutions and meet climate goals, however, access remains a significant barrier for many local governments, particularly among those in the global south. To address these deficits, digital solutions enable cities to tap technologies that process data, automate systems and provide key information that aids urban decision-making. Data analytics are transforming the way cities approach climate action whereby smart city digital technologies, such as the Internet of Things (IoT), big data analytics and AI, are at the forefront in collecting and measuring real-time information. Via the use of historical data and machine learning algorithms, big data can support urban decision makers in identifying trends, predicting outcomes and optimizing urban development strategies. IoT technologies also possess significant capacity to produce smart infrastructure that can bolster urban resilience to climate change. As versatile applications, interconnected devices that collect and exchange data, such as sensors and smart meters, enable cities to measure air and water quality, temperature, greenhouse gas emissions, humidity, noise and other environmental parameters producing continuous, real-time data streams that help cities to better understand and address climate-related challenges. IoT also enables cities to effectively track energy consumption patterns to optimize energy use, reduce emissions and develop smart grids and energy-efficient systems. Applications such as building-automation systems, dynamic electricity pricing and specific mobility applications have the potential to decrease carbon emissions by 10 to 15 percent[1]. They can also support sustainable urban mobility planning in which elements such as smart traffic lights, connected vehicles and intelligent transportations system all serve to improve traffic flow, minimize congestion and lower vehicle emissions. In this regard, smart mobility systems go beyond electric vehicles alone and leverage digital mobility services that integrate digital technology to provide optimized, sustainable and multi-modal transport solutions. Through automation, modelling and simulation capacities, AI can further enhance decision-making and resource management, enabling capabilities such as climate scenario simulations, land use change and infrastructure development among others. Leveraging vast quantities of data across environmental parameters, digital technologies possess significant potential to build climate resilience through monitoring and predictive analytical capabilities.

Urban digital twins also play key roles in enhancing urban responses to climate change and achieving the SDGs. As virtual replicas of cities, digital twins aggregate and visualize data from multiple sources to audit existing urban contexts, providing urban actors with 4D spatial information to assess the city at intra-urban levels. By performing advanced simulations based on machine learning and AI, digital twins enable decision makers to preview projected impacts based on urban transformations. They present a wide range of possible uses cases from smart city planning and infrastructure monitoring to energy efficiency optimization, disaster risk management and climate monitoring. Cities can identify areas most vulnerable

1 McKinsey & Company. Smart cities: Digital solutions for a more livable future. Available at: https://www.mckinsey.com/capabilities/operations/our-insights/smart-cities-digital-solutions-for-a-more-livable-future. June 5, 2018.

to climate change risks such as flooding and extreme heat, taking into consideration elements such as stormwater runoff, ground surface permeability, urban density and urban form as well as aspects such as vegetation and green coverage, therefore accounting for the integration of multiple considerations when producing comprehensive climate action plans. As detailed information-based tools, they therefore allow cities to fine tune resilience strategies in line with optimal scenarios and their available resources. A multitude of cities have adopted local digital twins, with Tampere and Helsinki in Finland among the forerunners across Europe. As a pioneer of the tool, Helsinki has been working with digital twin technology for over two decades and now hosts an urban planning digital replica that functions as an energy and climate atlas. Where heating buildings accounts for up to 56 percent of the city's carbon emission, the tool model's data on energy consumption in building stock to help achieve carbon neutrality by 2030, with the capacity to measure solar radiation and shadows on each surface of each building every hour and day of the year[1]. Tampere has leveraged the technology to test automated vehicles, and optimize energy efficiency and consumption, also launching a "data-driven city for citizen" programme to better understand citizen needs in urban service delivery. In addition, Tampere has integrated Minecraft as a unique educational tool to let children interact with the 3D city model and design their own environment to stimulate engagement in local development.

The integration of these digital technologies into local climate action is not merely an enhancement of existing practices but a fundamental shift in how cities operate and address the challenges presented by climate change. However, this transformation is not only driven by the adoption of advanced smart digital technologies but also relies on the broader ecosystem of digital services, governance and citizen engagement that support these innovations. To fully unlock these capacities and create climate-intelligent cities, online access to information systems, e-governance processes and digital citizenship each operate as distinctive components. Access to information systems allows both citizens and city officials to stay informed on elements such as existing environmental conditions, climate risks and the effectiveness of ongoing climate initiatives, building transparency and accountability through the production of accessible information. E-governance utilizes information and communications technology to enhance government management services, making it easier for cities to implement data-driven policies and responsive strategies whereby digital transformation enables more efficient, transparent and participatory decision-making processes. Digital citizenship reflects the process of education, skills development and the behavioural norms required by citizens to have sufficient access to information and communications technology. For young people leading climate action, being digitally literate and engaged will ensure they can better access and harness these tools to drive climate actions within their communities. This will also empower them to participate more actively in e-governance processes. It is therefore crucial that youth, in particular those from marginalized communities, have access to affordable and sustainable digital technologies to enable them to participate in green initiatives.

Integrating green technologies to secure sustainable urban futures

Low-carbon pathways are essential for cities to reduce greenhouse gas emissions and transition to net-zero. Ensuring cities stay on track hinges on the deployment of green technologies which present opportunities to accelerate reductions in greenhouse gas emissions across sectors, conserve resources and scale up climate change mitigation and adaptation efforts. Where buildings and the construction sector account for nearly 40 percent of energy-related global CO_2 emissions, a net-zero future is not possible without decarbonizing the built environment[2]. Achieving energy efficiency in buildings is the most cost-

1 Stardust. Virtual cities for very real benefits: from Local Digital Twins to the Cityverse. Available at: https://stardustproject.eu/news/virtual-cities-for-very-real-benefits-from-local-digital-twins-to-the-cityverse/.

2 OECD. Decarbonising Buildings in Cities and Regions. Available at: https://www.oecd.org/en/about/programmes/decarbonising-buildings-in-cities-and-regions.html.

effective greenhouse gas mitigation action available and represents the most impactful strategy to reduce urban electricity demand, energy bills and energy poverty. However, at present, the velocity of clean energy building retrofits is only one-sixth of where it needs to be to achieve 2030 decarbonization goals[1]. Cities are pressed to prioritize the acceleration of building sector transformations to achieve climate targets, while also providing affordable housing, green jobs, resilient infrastructure, and healthy living and working spaces. By capitalizing on the potential of green building technologies, connecting local building policy to national and international climate change agendas can help cities achieve short and long-term goals, and on a global scale, collaborative efforts are vital further progress. Together, the governments of France and Morocco with UNEP, launched the Buildings Breakthrough at COP28; a partnership that aims to accelerate the transformation of the sector and use clean technologies and sustainable solutions to make near-zero and resilient building the new normal by 2030 for all regions. In addition, the Cement and Concrete Breakthrough was launched by Canada and the United Arab Emirates with an inaugural cohort of endorsing countries including Germany, Ireland, Japan and the United Kingdom of Great Britain and Northern Ireland. The initiative seeks to make clean cement the primary choice in global markets with the aim of achieving near-zero cement production globally by 2030.

Amsterdam, the Kingdom of the Netherlands Energiesprong

Launched in 2011 in Amsterdam, Energiesprong works to deliver net-zero housing retrofits and scalable market solutions, contributing to carbon emissions reductions from buildings, less fuel poverty and improved energy efficiency. Working predominantly with social housing providers, it tackles multiple buildings simultaneously to reduce costs and maximize delivery impact. The work involves the off-site manufacturing of insulated wall panels which are then fitted on-site. These scalable and low-cost building retrofit solutions incorporate energy-efficient technologies, with renovations achieving an average of 70 ~ 80 percent reductions in energy use, see Figure 9.1. The programme now spans an additional five countries – France, Germany, Italy, the United Kingdom and the United States of America – in which it has realized over 10,000 net-zero retrofit projects to date.

Source: Energiesprong. High rise net zero retrofit – the Netherlands. Available at: https://energiesprong.org/high-rise-net-zero-retrofit-the-netherlands/

Figure 9.1 A completed Energiesprong net-zero retrofit renovation of an outdated Intervam apartment complex in Utrecht, the Kingdom of the Netherlands

1 World Resources Institute. 5 Priorities for Urban Climate Action in 2023 and Beyond. Available at: https://www.wri.org/insights/urban-climate-action-5-priorities. February 15, 2023.

Curitiba, Brazil
Solar Pyramid Project

In the push for greener cities, clean energy solutions are becoming an increasingly important part of urban landscapes. Located in Brazil's southern State of Paraná, Curitiba is leading the way in the clean energy revolution through the adoption of solar powered energy systems. The city launched its Solar Pyramid project on 29 March 2023, a landmark initiative representing the first solar plant to be built in Latin America. The project was supported by the C40 Cities Finance Facility, integrating around 8,600 photovoltaic cells on a deactivated landfill site in Caximba on the city's southern periphery, see Figure 9.2, as well as the rooftops of several bus terminals across the city[1]. The Solar Pyramid delivers clean, affordable energy while reducing the city's dependency on a fossil-fuel driven urban energy grid. The project provides 8 MW of installed energy capacity and is projected to decrease CO_2 emissions by 90,000 tons between 2020 and 2050, generating annual savings of over USD 50,000[2]. The project also partnered with AB Solar, a local practitioner network, and the city to collect gender-disaggregated data on employment in the solar sector to provide insight into where gender-specific barriers to employment exist and promote gender inclusivity across project planning and implementation phases. Curitiba has identified some 2,600 buildings as appropriate sites for similar photovoltaic installations[2].

Source: Image source: Daniel Castellano/SMCS. Curitiba: From landfill to solar revolution. Available at: https://www.c40.org/news/curitiba-from-landfill-to-solar-revolution/. May 22, 2023

Figure 9.2 Solar panels on the ex-landfill site in Caximba

1 Climate Scorecard. Brazil: Model Community Climate Mitigation Programs. Available at: https://www.climatescorecard.org/2024/01/brazil-model-community-climate-mitigation-programs/. January 7, 2024.

2 C40 Cities. Curitiba: From landfill to solar revolution. Available at: https://www.c40.org/news/curitiba-from-landfill-to-solar-revolution/. May 22, 2023.

The development of sustainable transport systems is also a core priority for cities to shift to low-carbon urban development models. While green technologies are still being improved for effective deployment on a mass scale, they present solutions to revolutionize urban mobility, offering the potential to transition from traditional fossil-fuel dependent systems towards sustainable models based on clean energy, enabling cities to cut emissions and improve transport efficiency. Electrification of urban transport is at the forefront of this transition where cities are urged to promote the uptake of electric vehicles and electric vehicle infrastructure to support its wider adoption. However, the transition to green urban mobility faces several roadblocks including technical, social and regulatory hurdles. Via a systematic approach, global cooperation, leadership coalitions, technological innovation and knowledge-sharing can combine to deliver integrated, low-carbon transport systems that provide high-quality and active mobility for all.

Supporting green education, training and entrepreneurship for young urban innovators

The development of digital and green technologies is reshaping how urban societies are approaching climate change. As younger generations are now taking primary roles in local action, the emergence of these new opportunities presents young climate leaders with the tools to facilitate proactive and dynamic climate solutions. It spurs a new wave of innovation and entrepreneurship among younger generations entering the green economy. By equipping young people with the knowledge and skills needed to use and advance these technologies, cities can foster a new generation of leaders who are prepared to tackle climate impacts head on and instil climate conscious practices. Providing education and training in climate technologies and innovation will equip young people with the skills needed to enter the green industry, and better understand the unique challenges that climate change presents. Furthermore, by encouraging their participation in green entrepreneurship, this will enable them to develop and scale up solutions tailored to specific urban environments, contributing to the overall resilience and sustainability of cities.

Developing youth-inclusive pathways into green careers

There is a now a widespread acceptance that green economies can support future growth while meeting global net-zero targets. As a catalyst to shift towards climate-resilient urban futures, their expansion constitutes a key process in the pursuit of achieving climate neutral cities. The creation of green jobs is a core pillar, helping to break free of fossil fuel dependency, protect natural resources and drive innovative urban climate solutions. Projections indicate that there are almost 16 million good green jobs across 74 global megacities, with forecasts suggesting that further green employment investment could lead to a 30 percent reduction in air pollution, improving air quality and protecting human health[1]. To realize the benefits, it is imperative that cities forge inclusive pathways into green job markets for younger generations entering the workforce. By ensuring their accessibility, this will enable cities to fully capitalize on young talent, promoting urban prosperity while making inroads on local climate goals. Cities are thus at the nexus of green job creation and by investing in the future skills and prioritizing the development of green workforces, they can offer well-paying, accessible jobs for all urban youth. Due to the unique economic conditions of cities, however, it is important to note that green jobs will vary regionally, with sectors spanning areas such as transport, energy, water,

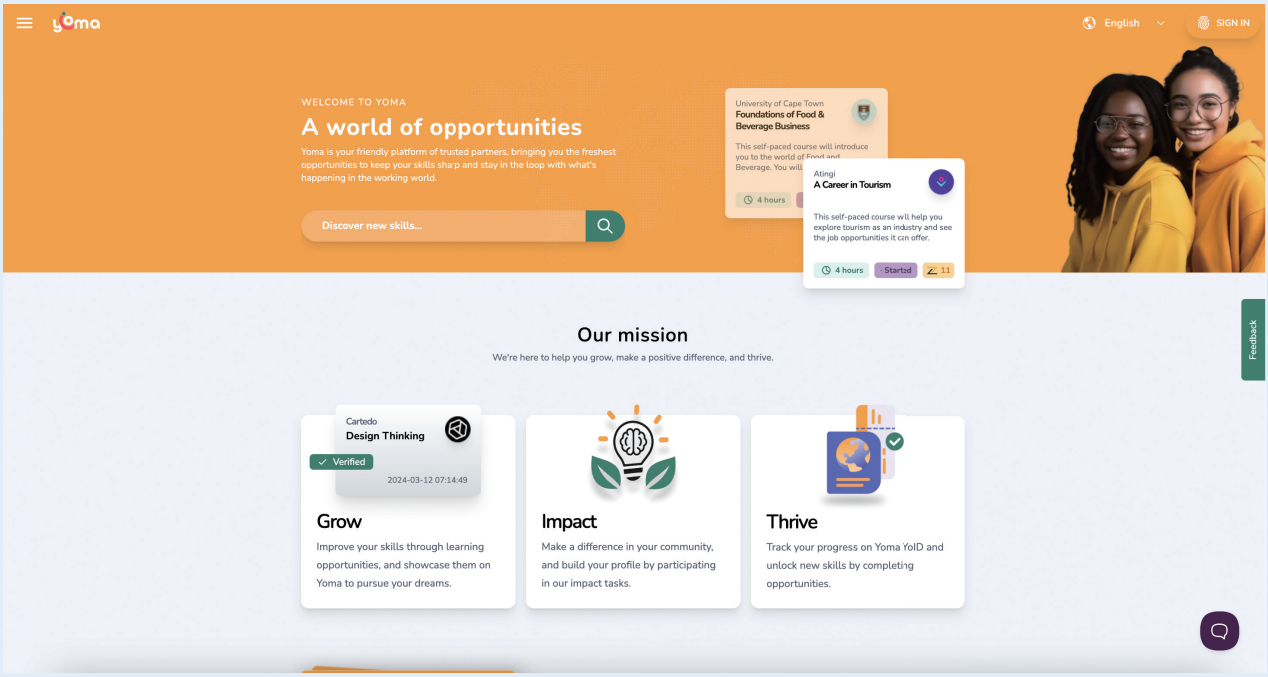
1 C40 Cities. *Good, Green Jobs*. Available at: https://www.c40.org/campaigns/good-green-jobs/.

waste management, construction and other emerging industries.

As industries transition towards more sustainable practices, there is an increasing need for workers who are equipped with the latest knowledge and skills relevant to green technologies and processes. Access to quality vocational education and skills development training underpins the ability for young people to use associated frontier technologies and generate new ideas for climate action as impacts evolve and complexify. As the foundational layer, science, technology and innovation is integral to effectively prepare young people for entry into green employment sectors and occupations. Cities are tasked to support training and skills development for green sectors, as well as digital education to ensure broad access to these opportunities in an increasingly digital world. By partnering with key educational institutions, private sector companies and NGOs, cities can co-design and implement programmes that focus on the specific needs of their own local green economies. For young learners, both initial and continuous vocational education and training are important to generate green skills formation, upskilling and reskilling, whereby programmes with a strong focus on work-based elements such as apprenticeships, specialized climate and sustainability modules and the development of teaching skills are of high value. Continuous education on upskilling and reskilling can help plug skill gaps, while credentials such as certified training and the recognition of training benefits can boost acceptance from employers and enhance employability among learners, fostering professional mobility. Local governments are well situated to consider the local specificities and integrate vulnerable groups into vocational education and training, which can help tackle issues of gender disparity in regard to entry into green job markets. By accelerating the uptake of vocational education and training to support younger generations entering green sectors, cities will become greener and smarter, driving a just climate transition.

Youth Agency Marketplace

As an additional tool, the Youth Agency Marketplace (YOMA) operates as a digital marketplace where youth from under-resourced and under-represented communities can actively engage in social impact projects and learning and earning opportunities via functions such as job-matching, mentoring, technical and transferable skills training, experience-based learning and work-based learning opportunities, all of which can be incorporated into a digital CV, see Figure 9.3. Developed in 2020, YOMA was among nine of the winning projects that emerged within the #SmartDevelopmentHack; an initiative launched by the European Commission and the German Federal Ministry for Economic Cooperation and Development to find innovative digital responses to the COVID-19 crisis. Through the digital platform, YOMA equips youth with future-based skills, which mitigate against climate change impacts and simultaneously provide opportunities for youth employment and entrepreneurship. To date, more than 250,000 youth members have received direct benefit from the YOMA digital platform. Notably, within the Enviro-Champs programme, 1,060 young individuals from marginalized communities have been equipped with skills to monitor water quality, serving as an early warning system for pollution. In Malawi, YOMA affiliated youth have engaged in reforestation projects, while graduates of the YOMA affiliated African Drone and Data Academy now harness innovation tools including drones and satellite imagery to monitor CO_2 absorbing biomass. By merging scientific data and remote sensing, YOMA is ensuring cost-effective and precise monitoring, contributing to programme progress on SDG implementation, see Figure 9.4.



Source: Image source: Yoma Official Website. Available at: https://yoma.world

Figure 9.3 The YOMA platform

Source: European Commission. The Digital Marketplace Yoma: Empowering African youth on their journey from learning to earning. Available at: https://international-partnerships.ec.europa.eu/policies/programming/projects/digital-marketplace-yoma-empowering-african-youth-their-journey-learning-earning_en

Figure 9.4 Youth from the Makamba Province, Burundi access YOMA in their native language, enabling inclusive access to digital opportunities

Supporting youth-led green entrepreneurship and innovation

Considering the coupled growth of technology and the green economy, an increasing proportion of young people are now actively seeking dynamic careers in green sectors. Where young entrepreneurs are more likely to experiment with new solutions and business models that address climate issues, cities can tap into their skills and ideas to enhance local climate action. The cultivation of urban environments which nurture technological and digital entrepreneurship, and innovation on climate change will play a major role in supporting youth-led start-ups and businesses to thrive. By creating enabling environments which encourage young people to pursue entrepreneurial endeavours in climate focused digital and technology sectors, cities can generate new green job opportunities that simultaneously drive sustainable economic growth and address climate challenges. However, opportunities for young people to become entrepreneurs and drive innovation on climate action are subject to a number of hurdles. Young climate innovators often face limited access to capital as well as a lack of mentorship and network opportunities, while regulatory and bureaucratic barriers also pose major challenges. In addition, certain sociocultural norms discourage young women and girls from pursuing careers in digital technology and innovation, while a lack of access to quality education and training opportunities on digital literacy, entrepreneurship and innovation continues to stymy pools of young people from engaging in these opportunities. To effectively lever the potential of youth, it is therefore imperative for cities to develop supportive environments that address these challenges.

Youth-led startups and innovations often struggle to gain traction due to limited financial resources such as access to grants, venture capital and other forms of financing. By allocating funds, cities and local governments can address the financial barriers that often prevent these businesses from scaling up. The provision of grants and subsidies for young entrepreneurs in climate-focused technology and digital sectors can provide the support needed to develop and expand their ideas. Youth innovation funds offer cities an effective means by which to foster new methods, providing financial support for project research and development, whilst subsidies can help cover operational costs key for early business stages. With growing concerns on climate inaction from young people around the world, Bloomberg Philanthropies launched the Youth Action Fund in April 2024 which will provide technical support and funding for 100 mayors to encourage tens of thousands of young people between the ages of 15 ~ 24 to design, develop and govern urgent climate solutions in their cities. Spanning cities across 38 countries that represent more than 62 million residents, the fund will advance critical community goals such as meeting decarbonization commitments or reducing consumption-based emissions. Each city will receive USD 50,000 to disseminate as microgrants to finance a groundswell of youth-led climate initiatives that address local urban contexts and goals. By cultivating urban environments in which investment is more readily available to young people looking to start businesses, cities can increase technological and digital innovation on climate action, and in turn create harmonious urban ecosystems that benefit from the establishment of youth-led start-ups and entrepreneurship.

Many young people have the passion and innovative ideas necessary for successful climate solutions but lack the technical skills and business acumen to turn their visions into viable enterprises. The integration of digital innovation hubs can provide important facilities for young entrepreneurs, offering access to resources such as mentorship, collaboration, new technologies and digital infrastructure. As innovation ecosystems, they can ease digital transformations and offer support to early-stage youth-led climate action initiatives by providing the necessary support systems for young entrepreneurs and activists to effectively scale up and build networks and partnerships. Start-up incubators connect young entrepreneurs with experienced mentors who can guide them through the complexities of starting a green business. This mentorship is crucial in navigating challenges specifically associated with climate-related ventures such as regulatory compliance, impact monitoring and market entry strategies. Where many incubators specialize in specific sectors such as clean energy, waste management or sustainable agriculture, they provide technical expertize and support

in developing environmentally friendly technologies or practices, ensuring that the startups are sustainable and innovative. As short, intensive programmes, incubators can also fast-track the growth of start-ups that have already gained some traction, helping them to scale up their operations, support their entry into new markets and increase their impact. In this light, they can be used to help green start-ups and businesses become investment ready and enter competitive markets. Offering immersive education on fundraising, product development and growth marketing opportunities and access to alumni networks and investor connections, they constitute a useful tool to early and mid-stage ventures. By creating enabling conditions such as access to capital, mentorship, streamlined regulations, education and a supportive culture, cities can empower young entrepreneurs and innovators to tackle climate challenges head-on. And in doing so, they can leverage the ingenuity and creativity of the next generation to spawn new solutions and drive impactful climate action.

The Youth Climate Action Lab is a youth-led movement addressing climate change in Bengaluru, India. Launched in November 2021, it has trained, mobilized and supported 12 young climate champions and 6 youth researchers to collect and share evidence, data and qualitative experiences to inform youth-led solutions along with over 120 young changemakers to cooperate and accelerate climate action in the city.

Digitalization as a process to bridge the gap between cities and youth

As digital innovators, young people around the world are increasingly driving urban climate action, bringing to the forefront new perspectives and unique ideas. Global youth movements call for young people's voices to be represented in local decision-making processes. With innovations such as civic technology, Geographic Information Systems, open data and digital platforms transforming modes of urban participation, the rise of digital tools has further amplified their ability to develop and lead climate initiatives making them indispensable in the global effort to combat climate change. Young people are therefore not just beneficiaries or champions of climate change but powerful co-creators and agents of change who can implement more ambitious solutions. If cities are fully committed to accelerate meaningful climate action and harness the full potential of citizen-led solutions, empowering and supporting young climate leaders is essential. In this light, cities are tasked to actively extend support beyond just recognition, and develop strategic commitments to provide the resources, platforms and opportunities that young people need to translate their ideas into impactful solutions. Diversified cooperation mechanisms will broaden engagement among young people, and in turn help to facilitate the development of new cutting-edge climate solutions and foster inclusive climate action. However, there is still considerable work that needs to be done on these fronts whereby cities must build bridges to enhance cooperation with young climate innovators.

The digital voice of youth presents cities and local governments with new means to gather detailed insights into current conversations on climate change, helping them stay attuned with emerging trends. With a growing digital realm, digital engagement will enable cities to connect with young people as changemakers and integrate them into climate action processes. As a medium for civic participation, digital engagement presents cities with a direct channel to tap into the diverse perspectives of young people from different communities. In this light, digital platforms serve as tools not just for communication but as spaces where young people can connect globally and collaborate across borders, share ideas and knowledge, and collectively organize actions with cities and urban decision makers. Digital platforms therefore have immense potential to bridge the gap between young people and city officials, ensuring that their voices are heard and accounted for in municipal level decision-making. This will not only enhance democratic governance but can inspire a sense of ownership and responsibility among young people, unlocking a means to foster iterative dialogue.

Young people pioneer digital activism through means

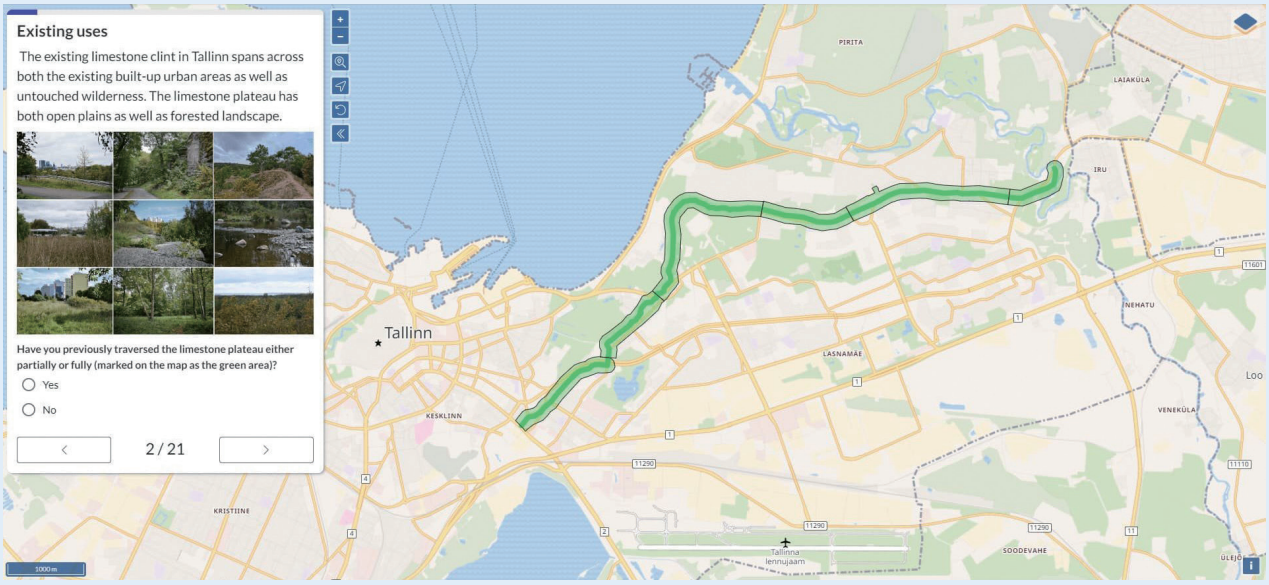
such as social media, vlogs and online petitions, each of which possess a unique means for individuals from diverse backgrounds to share their stories, ideas and concerns about the climate crisis. Social media is often used as a medium to raise awareness, mobilize communities and urge policymakers to act, and is also used to highlight the achievements of youth-led climate projects by amplifying visibility. In this regard, social media and digital communications platforms can amplify the voices of youth, allowing for the widespread dissemination of climate-related information and mobilization of supporters. Cities can harness the power of social media, incorporating digital narratives and engaging with social media campaigns to connect with young people in climate dialogue and action. The integration of interactive websites and applications will also help cities to strengthen climate engagement and collaboration with youth. As two notable youth-led organizations leveraging such tools, the Digital CoBosques Collective and the Fundación Tierra Montemariana are using social media campaigns as well as multi-media production such as videos, podcasts and interviews to engage local youth in Colombia in green jobs connected to the Amazon. These organizations feed into Colombia's Natural Wealth Programme which is working with the government to preserve biodiversity and protect critical ecosystems. Via direct engagement with indigenous populations and youth-led organizations, it advocates for the protection and conservation of indigenous and local environmental customs and territories, whereby youth-led organizations supported by the programme are working to educate and engage young people in protecting natural resources and practicing sustainable livelihoods within their communities.

Digital education resources also serve as impactful instruments to transfer knowledge for youth led climate action. Smart city dashboards incorporating climate information reflect powerful tools to engage young people in climate action. By transforming raw data into intuitive visual formats, this can make complex information more accessible and understandable for young people who may not have an associated technical background. Interactive data visualization tools allow young people to explore data and track progress on climate change, while gamification of climate data and real-time feedback of individual and collective climate efforts can make data more engaging and encourage active participation. Embracing digital engagement strategy, North Macedonia designed the Youth for Climate consultation platform, an interactive engagement method for school and college students which combines foresight tools and online gamification to engage youth in education on the climate crisis and establish a baseline for long-term communication between youth groups and the public administration. Educational and analytical activities incentivizes users to share videos, photos and stories about their involvement in climate action, co-design future visions for their communities, and promote people they trust as effective climate leaders and activists.

Tallinn, Estonia
The Klindi Park project: integrating digital citizen engagement solutions

Bordering the administrative districts of Kesklinn , Lasnam?e and Pirita, Klindi Park constitutes a key part of the City of Tallinn's green movement network under the Tallinn 2035 strategy. To assist the development of the continuous, nine-kilometre-long green park, the city used the online software service platform “Maptionnaire” to design a map-based survey and engage local citizens including youth in shaping the project. The survey sought to identify how local citizens perceived the existing space and what they would like to see in the new park. Survey design and outreach strategies provided translations including English, Estonian and Russian to ensure individuals from linguistic minorities and international residents could give input into the park's development. Social media advertising was also used to reach out to respondents while targeted surveys were conducted to gather pertinent data. This enabled planners to easily create the survey and export data for analysis, and residents could submit answers without needing

to download additional applications. With over 400 citizen proposals submitted by 2022, the preservation of existing green areas and historic sights emerged as core themes. Survey data was analysed using Geographic Information Systems and sentiment analysis to generate both geolocated and qualitative data, which allowed planners to gain insight into the visions of the local community and relay feedback into the planning process. As an innovative citizen engagement strategy, the project highlights the benefits of integrating digital solutions to expand engagement opportunities for inclusive development while also helping urban planners obtain actionable feedback that could be easily incorporated into the planning process, see Figure 9.5.



Source: Maptionnaire. Examples of Civic Engagement from Tallinn: From Green Mobility to Public Art Projects. Available at: https://www.maptionnaire.com/customer-stories/examples-of-civic-engagement-from-tallinn. September 27, 2022

Figure 9.5 The Klindi Park online map-based citizen engagement platform

Stimulating innovative modes of collaboration, cities are equipped with a diverse range of digital tools to increase youth cooperation and effectively mobilize them in climate action at local, regional and international levels. However, to equitably lever them as effective engagement and cooperation mechanisms, it is vital for cities to promote digital inclusivity to democratize climate action. To be truly inclusive, online tools and platforms facilitate diverse participation in local climate action in which young people can contribute regardless of their physical location or socioeconomic status. Such democratization ensures that urban climate initiatives are inclusive and reflect the concerns, ideas and aspiration of younger generations. However, the integration of digital technology is still subject to a number of barriers in certain urban areas. Not all residents are afforded equal access to digital tools, whether due to economic constraints, a lack of digital literacy or limited infrastructure, resulting in a digital divide. This leaves marginalized urban communities further behind, resulting in unequal participation, and exacerbates the positions of vulnerable populations who are at even greater risk from climate impacts. Consequently, it is critical that cities take steps to bridge this gap and ensure that all residents can benefit from digital tools. Actions such as the provision of free or subsidized internet access in low-income marginalized neighbourhoods, as well as digital literacy programmes, can help boost digital inclusion to ensure that urban climate action is equitable and leaves no one behind.

By recognizing urban youth as active participants and implementing partners in climate action, cities can utilize their energy, creativity and unique perspectives to generate new design solutions and accelerate progress at the local level. Urban actors possess a real opportunity to work with young people to deliver bold and ambitious climate action, however, efforts must be ramped up to foster new means of productive cooperation. Young people are often faced with barriers in collaborating with local governments and are therefore prevented from effectively shaping local development, reinforcing the need for partnerships and networks to build robust ecosystems that better connect them with municipal actors. Strengthening cooperation between cities and youth is therefore imperative to empower, foster cooperation and rally engagement from ambitious young climate actors. Together, strategic partnerships between youth, mayors and city leaders across local government agencies, the private sector, academia, NGOs and civil society can foster new dynamic partnerships to drive local climate solutions in which supportive ecosystems nurture young talent.

A number of global initiatives are working to build networks to connect young climate leaders with cities. Launched in 2019 during COP25, the UNESCO Youth Climate Action Network is an innovative platform bridging youth climate networks globally to increase cooperation and upscale youth-led climate action and research. The platform supports youth in the creation and dissemination of knowledge, proposed innovative action and solutions to local climate challenges, strengthens youth capacities and helps youth voices to be heard through participation in high-level climate events and dialogues. The C40 Youth Hub connects climate leaders from cities and countries, open to youth between the ages of 15 ~ 29 who are active in city youth climate councils and youth-led climate organizations. The hub allows members to promote their activities within a global network of youth leaders, sharing successes and challenges with like-minded individuals who are committed to instigate climate action at the local level. In conjunction, the C40 City Youth Engagement Network further assists city officials in engaging youth in climate action. Functioning as a peer-to-peer network, it brings together different city officials to share experiences and work together to deliver innovative approaches to meaningful youth engagement. As a practical learning network, it provides cities with resources and capacity building opportunities via workshops, virtual events and webinars to strengthening youth engagement platforms.

Urban Vulnerability Atlas

As a milestone to the RISE-UP flagship programme, the Urban Vulnerability Atlas is an advanced virtual and interactive web-based platform designed to assist national and local governments in identifying, analysing and mitigating the complex vulnerabilities associated with climate change, biodiversity loss and urbanization?. It supports urban resilience and sustainable urban development. Via the integration of multi-layered data and highlighting local and regional vulnerability hotspots, the tool provides invaluable insights to enhance national and local resilience strategies and sustainable urban development action plans. It aims to visualize vulnerabilities in cities and urban areas in an accessible manner to a wider audience.

The core functions of the atlas include:

(1) Integrated data layers for RISE-UP project cities: the atlas combines climate data, biodiversity metrics, urban growth patterns and socioeconomic variables, providing a holistic view of urban vulnerabilities.

(2) Interactive visualization: users can explore data through dynamic maps, charts, graphs and StoryMaps, making complex information accessible to a wide audience.

(3) Hotspot identification: the online tool pinpoints areas of high vulnerability, helping prioritize interventions for communities, infrastructure, services, assets and ecosystems.

(4) Scalability: the atlas is designed to be replicable and adaptable to various urban contexts and regions globally, but particularly benefiting low-resource Least Developed Countries and Small Islands Developing States.

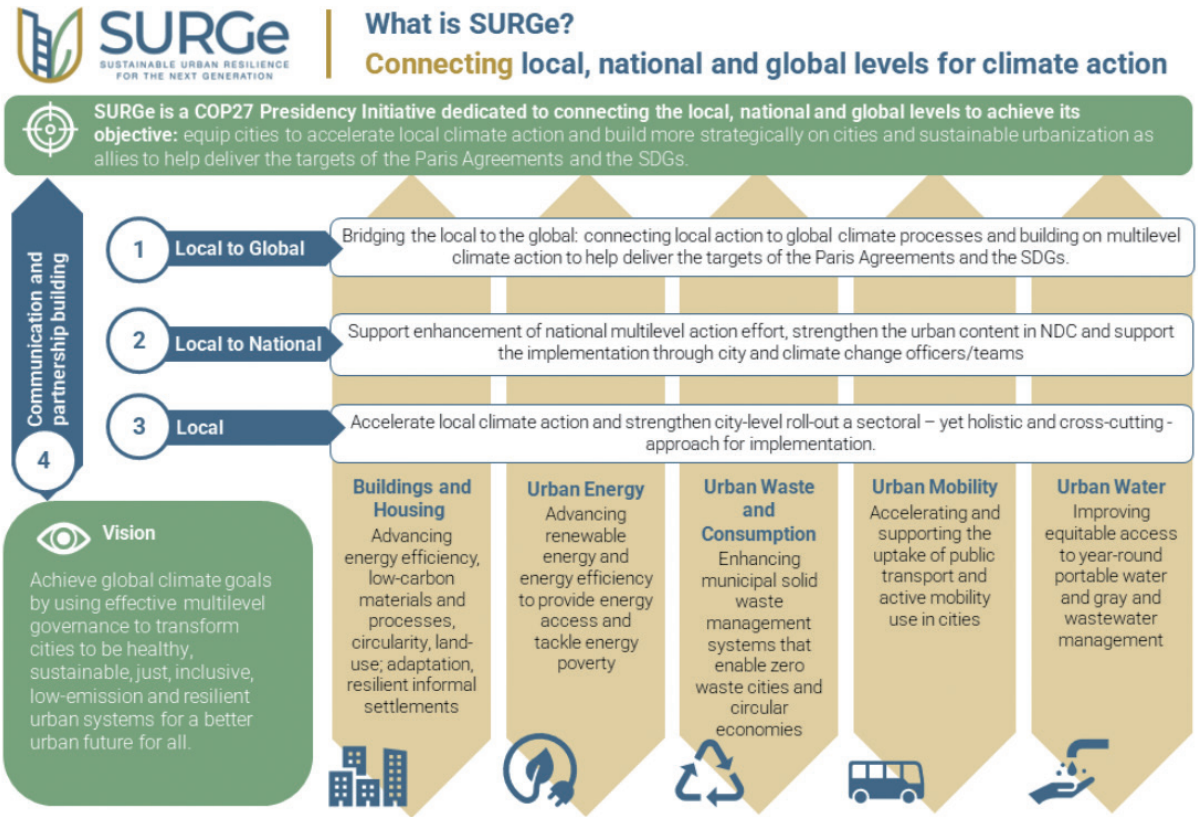
(5) Decision support: the atlas offers tools for multi-

criteria decision-making, scenario analysis and impact assessments, supporting evidence-based policymaking and programming.

The atlas adds value by integrating climate data, biodiversity metrics, urban growth patterns and socioeconomic variables into a single, comprehensive tool. Interactive visualizations and hotspot identification facilitates evidence-based decision-making, and the tool addresses gaps in urban planning and data, providing a holistic view of vulnerabilities especially in data-scarce, low-resource Least Developed Countries and Small Islands Developing States. In addition, it supports informed policymaking and enables access to climate finance through evidence-based data on vulnerabilities and risks. As an inclusive tool, it is designed to be accessible even to those without technical or scientific expertize, making it a valuable tool for a diverse audience involved in resilience and sustainable urban development including young people.

Sustainable Urban Resilience for the Next Generation

Sustainable Urban Resilience for the Next Generation (SURGe) is a COP27 Presidency Initiative committed to connecting local, national and global levels with the vision to achieve global climate goals by leveraging multilevel governance to catalyse healthy, sustainable, just, inclusive, low-emission and resilient urban systems for a better urban future for all. SURGe is focused on equipping cities to accelerate local climate action and promote strategic sustainable urbanization, promoting cities as enabling environments to help deliver the targets of the Paris Agreement and the SDGs, see Figure 9.6. The initiative has been developed under the leadership of the COP27 Presidency in cooperation with UN-Habitat and facilitated by Local Governments for Sustainability (ICLEI). It was officially



Source: UN-Habitat and ICLEI. Sustainable Urban Resilience for the Next Generation (SURGe). Available at: https://unhabitat.org/sites/default/files/2023/06/cop27_surge_initiative_updated_concept_note.pdf

Figure 9.6 The SURGe process

launched at the Ministerial Meeting on Urbanization and Climate Change at COP27 and has since been endorsed by more than 180 global partners.

The initiative recognizes challenges of insufficient recognition with regard to urban climate action at national and international levels, and aims to strengthen implementation of the climate agenda in and with cities through multi-level governance. To this end, SURGe builds on the momentum of the Glasgow Pact and offers an entry point to use multi-stakeholder collaboration to drive implementation at the local level. Where there is not enough climate finance reaching the local level, the initiative will work with national governments to set up context-specific finance mechanisms, through multi-lateral development banks and other bi-lateral and vertical climate funds, to facilitate access to finance along with city networks, finance facilities and additional partners to implement city projects globally and develop a pipeline of bankable projects across five working groups. To address the lack of technical and human resources for climate issues within local governments, it will also work with city networks and partners to provide technical assistance to local governments and build up technical and human resource in cities, harnessing the global multi-stakeholder expert community to share knowledge and best practices for city-to-city learning. In addition, it will accelerate technology and innovation in cities to plug research and action gaps, and ensure that project design targets the most vulnerable communities to facilitate broad participation.

Policy suggestions

In light of the growing urgency to decarbonize urban economies and drive progress on local climate action, there is now an accelerating convergence between green and smart digital technologies.

It is this convergence that creates the platform for potentially disruptive urban transition in which green and digital transitions can be mutually reinforcing. Directly contributing to climate change mitigation, green technologies unlock the ability for cities to achieve net-zero. Supplementing these, smart digital technologies provide cities with the data and insights required to maximize the efficiency and impact of green technology interventions. Components such as, big data analytics, machine learning, artificial intelligence and digital twins, generate targeted, user-centric solutions which can help calibrate and optimize urban systems. Improving energy efficiency, monitoring air quality and enhancing intelligent water and waste management reflect just some of these smart city capabilities. Accordingly, where these tools are seen to facilitate climate-responsive urban infrastructure systems, it is also important to acknowledge that they expose urban infrastructures to new risks and dependencies. Building secure and adaptable systems will thus be essential to ensure the benefits of these technologies are realized without compromising the safety and efficiency of urban systems.

Critically, it is young people who possess the full capacity to advance, refine and integrate these technologies in practice to instigate impactful climate solutions at the local level. For cities to realize this potential, however, the delivery of inclusive and quality education on climate change, green technologies and sustainability must be recognized as an essential first step. Providing access to adequate education and training will ensure that young populations have the necessary technical and knowledge-based skills to successfully integrate into green careers and develop tailored climate solutions. It is also evident that young people require more accessible pathways into green job markets, particularly within marginalized urban populations and communities, while cities must work to develop facilitative urban environments which encourage and promote green digital entrepreneurship to stimulate new climate solutions among young urban innovators.

It is young people who are positioned as crucial players in delivering on climate change at the local level. Growing up in a digital era they are tech-savvy – digital tools constitute core communication mechanisms through which young people mobilize for local climate action. Digitalization has reflected an instrumental process in raising the voice of young climate activists and leaders. Digital platforms and networks constitute

invaluable spaces for youth to advocate, connect and develop climate solutions, however, cities are yet to fully leverage digital engagement as a means to connect with these young climate actors. While these digital tools can open up new channels for engagement with young people, it is equally important that cities recognize their potential to exacerbate underlying technological divides. Alongside the development of global digital networks, it is key for cities to increase digital literacy and vital digital skills among marginalized groups and communities in order to maximize the accessibility of digital tools among young citizens. Investment in digital technology for learning and teaching is therefore an essential priority.

Strengthening these digital collaboration mechanisms, the development of strategic partnerships between youth, local governments, the private sector, academia and civil society along with inclusive urban policies will further reinforce the voice of youth in local climate action processes, while interconnected networks of knowledge within and across cities and businesses will continue to push innovation forward and amplify the benefits of green and digital technologies. It is clear that the urban world must work to ensure climate action is citizen-centred putting youth at the forefront, promoting the strategic application of technology to effectively tackle the climate crisis and ensure that no one is left behind.

Disclaimer

The designations employed and the presentation of the material in this publication do not imply the expression of any opinion whatsoever on the part of the United Nations Human Settlements Programme, Bureau International des Expositions, the Ministry of Housing and Urban-Rural Development of the People's Republic of China, and Shanghai Municipal People's Government concerning the legal status of any country, territory, city or area, or of its authorities, or concerning the delimitation of its frontier or boundaries, or regarding its economic system or degree of development. The analysis, conclusions and recommendations of the report do not necessarily reflect the views of United Nations Human Settlements Programme and Bureau International des Expositions, the Ministry of Housing and Urban-Rural Development of the People' Republic of China and Shanghai Municipal People's Government. Reference to names, films, commercial products, and processes does not imply their endorsement by the United Nations Human Settlements Programme, Bureau International des Expositions, the Ministry of Housing and Urban-Rural Development of the People's Republic of China and Shanghai Municipal People's Government.

图书在版编目（CIP）数据

上海手册 ：21世纪城市可持续发展指南. 2024年度报告 = SHANGHAI MANUAL ： A Guide for Sustainable Urban Development in the 21st Century • 2024 Annual Report ：英文 / 联合国人居署, 国际展览局, 上海市人民政府主编 ；中华人民共和国住房和城乡建设部支持. 上海 ：上海科学技术出版社, 2024. 12. -- ISBN 978-7-5478-6970-3

Ⅰ. F299.275.1

中国国家版本馆CIP数据核字第2024FY1423号

责任编辑：楼玲玲　汪　茜

SHANGHAI MANUAL: A Guide for Sustainable Urban Development in the 21st Century · 2024 Annual Report

UN-Habitat
Bureau International des Expositions
Shanghai Municipal People's Government
Supported by Ministry of Housing and Urban-Rural Development of the People's Republic of China

上海世纪出版（集团）有限公司
上 海 科 学 技 术 出 版 社　出版、发行
（上海市闵行区号景路 159 弄 A 座 9F–10F）
邮政编码 201101　www. sstp. cn
******** 印刷有限公司印刷
开本 889 × 1194　1/16　印张 14.75
字数 521 千字
2024 年 12 月第 1 版　2024 年 12 月第 1 次印刷
ISBN 978–7–5478–6970–3/F · 57