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CITY-TO-CITY PARTNERSHIPS AND SOUTH-SOUTH AND TRIANGULAR COOPERATION ON SUSTAINABLE URBAN DEVELOPMENT

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Urban planning and management and its impacts in addressing climate change and fostering sustainable development

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FOREWORD FROM THE EXECUTIVE DIRECTOR OF THE INTER-AMERICAN INSTITUTE FOR GLOBAL CHANGE RESEARCH - IAI, DR. MARCOS REGIS DA SILVA

The Inter-American Institute for Global Change Research (IAI) and the United Nations Office for South-South Cooperation (UNOSSC) joined forces to assist countries in achieving the Sustainable Development Goals, especially Goal 11: Make cities and human settlements inclusive, safe, resilient and sustainable. This collaboration is of exceptional importance in Latin America and the Caribbean, where 81 percent of the population reside in urban areas, making it one of the most urbanized regions in the world.

Such large-scale urbanization in Latin America and the Caribbean creates uniquely complex problems requiring innovative science and new partnerships able to provide decision makers with the data and information needed to develop effective public policies. The call for these new scientific approaches and partnerships is reflected in the High-Level United Nations Conference on South-South Cooperation (BAPA+40) outcome document which highlights the need for more regional mechanisms to share and strengthen successful science, technology and innovation policies and strategies. Perhaps equally important, BAPA+40 encouraged countries to explore new opportunities for cross-border, interregional coordination and collaboration between science, technology and innovation initiatives. It is at this intersection between science and policy that the IAI resides and the need for and benefits of South-South collaboration can be best understood.

Latin America and the Caribbean benefit from a number of regional intergovernmental organizations and mechanisms that facilitate multinational collaboration and development of interdisciplinary and transdisciplinary research. Among these organizations, the IAI reflects the ability of Latin American and Caribbean countries to work together in the development of transdisciplinary science and research that aim to provide policymakers with the tools and institutional capacities to better face the challenges posed by global change. Projects developed under transdisciplinary approaches also provide local communities in the region with equitable participation in their development and the full benefits of the results.

This collaborative, multinational and mutually beneficial regional government effort is guided by the understanding that global change is complex, multifaceted and dynamic, and urgently requires innovative science and training to increase institutional and research capacities and foster stakeholder involvement. That is why the IAI supports efforts to increase South-South collaboration and new regional approaches to science.

The Latin American and the Caribbean region can draw on unique and rich scientific and technological resources. This capacity contributes, on an equitable basis with other more developed regions, to the promotion of sustainable development and use of natural resources, research on climate change, and collaboration on many other pressing topics. South-South cooperation offers opportunities for the use of these resources in the development of a region-wide strategy to meet the

challenges posed by global changes. Such a shared vision and strategy enable joint approaches that are regional in scope and have global benefits and impacts.

The IAI is grateful for the opportunity to partner with the UNOSSC and for its support of this publication. The IAI very much look forward to working with its partners in the region and in other parts of the globe to ensure the conservation and sustainable use of natural resources and the survival of the planet.

Montevideo, 30 October 2019

FOREWORD BY THE ENVOY OF THE UNITED NATIONS SECRETARY-GENERAL ON SOUTH-SOUTH COOPERATION AND DIRECTOR, UNITED NATIONS OFFICE FOR SOUTH-SOUTH COOPERATION

2019 has been a landmark year for South-South and triangular cooperation (SSTC), with the conclusion of the Second High-level United Nations Conference on South-South Cooperation (BAPA+40), held in Buenos Aires, in March. By the adoption of the Conference outcome document (UNGA Resolution 73/291, annex), the global community, including United Nations entities and other stakeholders, highlighted the immense potential of SSTC to contribute to the achievement of the 2030 Agenda.

The final document of the BAPA+40 reflects the evolution of South-South Cooperation (SSC) and sets out a path into the future. It opens up a range of possibilities to further expand the horizons of collaboration. The outcome document also acknowledges that there has been an expansion of the number of key development actors, including, *inter alia*, subnational entities. The reference to subnational entities in the BAPA+40 outcome document is especially significant in the perspective of this report, which focuses on how cities are using innovative, collaborative and evidence-based processes to tackle the challenges of climate change and deliver sustainable development, as well as how SSTC facilitates wider developmental outcomes.

UNOSSC has been increasingly interested in the role of cities in SSTC. In the light of the Belt and Road Initiative, UNOSSC initiated the "SSTC among Maritime-Continental Silk Road Cities for Sustainable Development Project" (Cities Project) in September 2017, in partnership with the China International Center for Economic and Technologic Exchange (CICETE), to help build partnerships for sustainable development through regional and international city-to-city South-South cooperation. As a global project directly implemented by UNOSSC, its overarching goal is to support its partners in leveraging the resources and opportunities offered by BRI to advance the SDGs. The project has so far attracted city partners in Turkey, Iran, Mongolia, Gambia, Ghana, Uzbekistan, Nepal, China, among others.

It is truly inspiring to see the depth and variety of city-to-city partnerships and SSTC in this publication on planning and management of the urban space to tackle climate change and deliver on the SDGs, prepared by UNOSSC in partnership with the IAI. Moreover, it underlines the importance of enhancing SSTC to synchronize global and local efforts to achieve the 2030 Agenda and fulfil the commitments of the Paris Agreement.

When we think about global impact and local actions, we have all learned from our experiences of the Millennium Development Goals - MDG era, where MDG "localization" came rather late in the process, in a vertical process from global to national and local level. Today's Sustainable Development Goals (SDG) were born in an era of transformation, in a world that sees greater networks and

integration, connecting regions, nations, and cities in an unprecedented manner. In this context, there is a greater potential for SSC to synchronize regional and local efforts towards achieving the SDGs. Such efforts mean aligning visions, strengthening basic infrastructure and connectivity, enhancing technical and operational capacities, and forging concrete project partnerships.

Cities consume more than two thirds of the world's energy and, therefore, have a significant carbon footprint, accounting for more than 70 percent of global CO_2 emissions. Nevertheless, cities are at the frontier of innovation and could deliver sustained and inclusive growth and developmental outcomes for their inhabitants.

The United Nations Secretary-General, António Guterres, said at the C40 Mayors Summit, held in October 2019, that "cities are where the climate battle will largely be won or lost". I am confident that South-South and triangular cooperation will prove an important tool in ensuring such a victory.

Jorge Chediek
Envoy of the Secretary-General on South-South Cooperation
and Director, United Nations Office for South-South Cooperation

DISCLAIMER

This report "City-to-City Partnerships and South-South and Triangular Cooperation on Sustainable Urban Development: urban planning and management and its impacts in addressing climate change and fostering sustainable development" is a joint publication of the United Nations Office for South-South Cooperation (UNOSSC) and the Inter-American Institute for Global Change Research (IAI). The report has been prepared in the context of the South-South Cooperation Action Plan for the Secretary-General's Climate Change Engagement Strategy (2017-2021).

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ACRONYMS

ACCCRN	Asian Cities Climate Change Resilience Network
AIIB	Asian Infrastructure Development Bank
AMBA	Metropolitan Area of Buenos Aires
APRA	Buenos Aires Environmental Protection Agency
ASEAN	Association of Southeast Asian Nations
BAPA	Buenos Aires Plan of Action
BMI	Federal Ministry of the Interior, Building and Community (Germany)
BMU	Federal Ministry for the Environment, Nature Conservation, and Nuclear Safety (Germany)
C40	C40 Cities Climate Leadership Group
CABA	City of Buenos Aires
CFCC	Cities Fit for Climate Change
CO_2	Carbon Dioxide
COP	Conference of Parties
CPDRC	China Population and Development Research Centre
ELAC	Local Strategy Climate Action (2014-2020)
EUR	Euro
FAO	Food and Agriculture Organization
G20	Group of Twenty
G77	Group of 77
GCoM	Global Covenant of Mayors for Climate and Energy
GDP	Gross Domestic Product
GEF	Global Environment Facility
GHG	greenhouse gases
GIZ	German International Cooperation
GOI	Government of India
GPC	Global Protocol for Community Scale Inventories
GPSC	Global Platform for Sustainable Cities

GSV	Google Street View
GVI	Green View Index
Habitat-III	UN Conference on Housing and Sustainable Urban Development
IAI	Inter-American Institute for Global Change Research
ICLEI	International Council for Local Environmental Initiatives
IKI	International Climate Initiative
ILCC	International Low Carbon City
ILO	International Labour Organization
INEGI	National Institute of Statistics and Geography
IPCC	Intergovernmental Panel on Climate Change
ITDP	Institute for Transportation and Development Policy
IVR	Interactive Voice Response
kWh	Kilowatt hour
LDCs	Least developed countries
LLDCs	Landlocked developing countries
MILE	Municipal Institute of Learning
MoEFCC	Ministry of Environment, Forests and Climate Change (India)
MOF	Ministry of Finance
MIT	Massachusetts Institute of Technology
NIUA	National Institute of Urban Affairs
NUA	New Urban Agenda
OiER	Organization for International Relations
PACC	Plan for Action on Climate Change to 2030
PACCM	Climate Action Programme (2014-2020)
PADIS	Population Administration Decision Information System
PADIS-INT	Population Projection Software Application
PDSSC	Population and Development South-South Cooperation Centre of Excellence
PM	Particulate matter (emissions)
RMB	Chinese currency – renminbi (yuan)

SDGs	Sustainable Development Goals
SIDS	Small island developing states
SSC	South-South cooperation
SSCCC	South-South cooperation on climate change
SSTC	South-South and triangular cooperation
U20	Urban 20
UCLG	United Cities and Local Governments
UHCRC	United Cities and Local Governments
UHI	Urban Heat Island
UN	United Nations
UNDP	United Nations Development Programme
UNECA	United Nations Economic Commission for Africa
UNECE	United Nations Economic Commission for Europe
UNEP	United Nations Environment Programme
UNESCAP	United Nations Economic and Social Commission for Asia and the Pacific
UNESCO	United Nations Educational, Scientific, and Cultural Organization
UNESCWA	United Nations Economic and Social Commission for Western Asia
UNFCCC	United Nations Framework Convention on Climate Change
UNFPA	United Nations Population Fund
UNIDO	United Nations Industrial Development Organization
UNOSSC	United Nations Office for South-South Cooperation
US	United States
USAID	United States Agency for International Development
USP	University of São Paulo
WHO	World Health Organization
WIPO	World Intellectual Property Organization
WUF	World Urban Forum

EXECUTIVE SUMMARY

The scale of the challenges associated with sustainable development and climate change are global in nature. 2015 was a landmark year for charting a new era of sustainable development with deepening recognition of the scale and global nature of the sustainable development and climate change challenges. At the special summit, held at UN Headquarters, the world embraced the 2030 Agenda for Sustainable Development - a framework for global actions to achieve a set of 17 Sustainable Development Goals (SDGs) by the year 2030. Also that year, at the twenty-first session of the Conference of the Parties (CoP) to the United Nations Framework Convention on Climate Change (UNFCCC), the Member States adopted the Paris Agreement to accelerate and intensify actions to tackle the threat of climate change.

Tackling climate change and fostering sustainable development agendas are two mutually reinforcing sides of the same coin. Climate change exacerbates threats, as well as making delivering on the sustainable development agenda more difficult, because it reverses positive trends, creates new uncertainties and increases the costs of adaptation and building resilience.The global nature of these challenges calls for the widest possible cooperation, involving various stakeholders, to accelerate the reduction of global greenhouse gas emissions (GHG) and adapt to the adverse impacts of climate change, in the context of sustainable development and efforts to eradicate poverty.

The New Urban Agenda (NUA, 2016) brought a new shared vision of the transformative potential of urbanization as a driver of sustainable growth and poverty reduction.[1] The NUA recognizes that rapid urbanization and changing demographics require a more holistic, equitable and integrated approach to building resilience and sustainable development, driven by global best practice.

Both the 2030 Agenda (mainly through SDG 17) and the New Urban Agenda consider North-South, South-South and triangular cooperation as means of implementation. This perspective, strengthened by the outcome document of the Second High-Level UN Conference on South-South Cooperation, held in Buenos Aires in 2019 (BAPA+40), unveils new possibilities for SSTC to support improvedurbanization and sustainable urban development.

North-South development cooperation models will not be sufficient on their own for countries to fulfil the bold aspirations of either the Paris Agreement or the Sustainable Development Goals (SDGs). A more diverse landscape for international cooperation is required, one that can bring together new partners and new approaches to complement longstanding North-South international development cooperation.

SSC complements North-South development cooperation in areas like climate change, helping to broaden the range and scope of development partnerships in which developing countries can engage to pursue their national sustainable development priorities and objectives. The recent evolution of SSTC, and the rising prominence of such cooperation in sustainable development and climate change related issues, provide important lessons about its role in enhancing ownership and strengthening the capacity of developing countries in their national development efforts, as well as in working with each other in mutually supportive and beneficial ways.

SSTC can serve as a framework for enhancing cooperation on urban planning and management that are closely linked to climate change and sustainable development. These

1 The New Urban Agenda was adopted at the United Nations Conference on Housing and Sustainable Urban Development (Habitat III) in Quito, Ecuador, on 20 October 2016. The NUA was endorsed by the United Nations General Assembly at its sixty-eighth plenary meeting of the seventy-first session on 23 December 2016

areas include, among others, the management of water resources; urban mobility; development of green building and green spaces; the prevention or reduction of floods; the generation and use of various forms of energy, particularly from renewable sources; the prevention of urban sprawl and marginalization; climate-proof urban development; data sharing; financing of climate change actions; and development, innovation, diffusion, use and transfer of climate change-related technologies. All of these areas are closely linked to sustainable development and climate change actions that call for close SSC within groups of developing countries.

This report focuses on the central theme of how cities are using innovative, collaborative and evidence-based processes to tackle the challenges of climate change and achieve sustainable development. In particular, it examines three broad issues pertinent to sustainable development for cities, namely:How does the evolving context and challenges of climate change impact cities? What good practices and experiences emerge from management of the urban space through diverse and inclusive strategies? and How can SSTC help to facilitate wider developmental outcomes, particularly those related to planning and management of the urban space in addressing climate change and delivering on the SDGs?

Cities are at the frontier of transformation and could deliver sustained and inclusive growth and developmental outcomes for their inhabitants.The scale of urbanization is unprecedented and, as the world rapidly urbanizes, two-thirds of global populations are expected to live in cities by 2050. However, whilst increased urban activity brings potential for economic growth and social transformation, it also brings several challenges.These include increasing exposure to climatic hazards (e.g. cyclones, floods, droughts), rising greenhouse gas emissions, and other associated challenges, such as air pollution, waste, transportation, energy, and land use change.

The IPCC Special Report (2018) also emphasizes the role of cities in being able to "amplify or reduce the impacts associated with 1.5°C of warming" and calls for immediate action. It highlights the role that city networks can play in facilitating knowledge sharing and replicating experiences that have worked elsewhere.However, it also notes that cities may be well placed to drive forward progressive cost-effective strategies and actions across sectors, including with the engagement of multiple stakeholders in order to make the urban transition.

SSTC can be a powerful way for cities from the Global South to exchange, pool and harness knowledge and technology concerning solutions developed in similar contexts and therefore better suited to their local developmental needs.Over the years, the concept of SSC in the urban space has evolved from models of twinning of cities and now extends to a broader framework at bilateral, regional, intra-regional or inter-regional level. By promoting an agenda of collaborative action, cities will be better placed to harness a wider knowledge base, engage with a wider set of experts through national and international networks, and leverage resources from the public and private sectors, and thus gear up to make their cities ready for the future.

A growing number of developing countries are undertaking traditional and new modalities of SSC, as a way of mutually addressing global challenges such as climate change. Based on the limited sampling of initiatives of city-to-city partnerships and SSTC covered in this report, cities around the globe view their cooperation to be a valuable means of sharing their experiences and of learning from each other, based on mutual trust, partnership, and understanding.

The scope of SSTC has significantly expanded, but additional efforts are needed to promote political momentum and enhanced partnerships for sustainable development. The success of

SSTC initiatives depends on high-level political support for, and commitment to, such cooperation among the partners involved. SSTC mechanisms and institutional arrangements need to be further enhanced and improved. One of the challenges faced in advancingSSTC, both in the past and currently, continues to be relatively weak organizational and institutional technical support, both at international level and within most countries. In many cases, the national and intergovernmental institutions of the Global South set up to advance SSC continue to require greater levels of institutional capacity and human and financial resources. Nevertheless, this is now rapidly changing with the rise of new Southern institutions and the strengthening of existing ones; the establishment of national agencies to undertake SSTC; and greater emphasis placed by the United Nations System and its specialized agencies, funds and programmes on supporting SSTC.

However, clear and comparable information about the level of implementation of city-to-city partnerships and/or SSTC initiatives on urban planning and management continues to be difficult to obtain. This makes it difficult to obtain a comprehensive overview, because there is little uniformity in the information available from different agencies, cities and Member States. Despite this, the cases researched in preparing this report show that cities in developing countries have also emerged as relevant stakeholders at international level.

This report is intended as a knowledge resource to facilitate SSTC so that successes can be adapted, replicated and scaled up by other cities. Selected case studies provide an illustrative overview of the ways in which SSTC initiatives are being undertaken by and in developing countries. The case studies highlight the importance of shared knowledge, practices, and experiences in helping to further the implementation of the 2030 Agenda and accelerate momentum towards sustainable development.

The present report, by offering concrete examples of city-to-city partnerships and/or SSTC initiatives on urban planning and management, seeks to inspire further action in this area. An online tool is now available on the UNOSSC website, entitled South-South Galaxy (http://www.southsouth-galaxy.org/), where stakeholders are welcome to record current activities and additional lessons learned and good practices related to SSCT, which will serve as inputs for future reports.

I. INTRODUCTION

This report is published at a time when South-South and triangular cooperation (SSTC) and sustainable urban development are increasingly recognized as important means for implementing the Paris Agreement (UNFCCC 2015a) and the 2030 Agenda for Sustainable Development with its 17 SDGs (UN 2015a). The adoption of the Paris Agreement and the 2030 Agenda in 2015 represent unprecedented multilateral commitments to tackling the global challenges of addressing climate change and achieving sustainable development. While urban development and climate action are emphasized as SDG 11 and SDG 13 respectively, these are also inter-connected with all the other SDGs. [2]

This report focuses on the central theme of how cities are using innovative, collaborative and evidence-based processes to tackle the challenges of climate change and achieve sustainable development. In particular, it examines broad issues that are pertinent to sustainable development for cities, namely: how does the evolving context and challenges of climate change impact cities; and, what goodpractices and experiences emerge from management of the urban space through diverse, inclusive and sustainable strategies?

The report also examines how SSTC can help to further development outcomes, particularly those related to management and planning of the urban space in addressing climate change and fostering sustainable development.

The outcome document of the second High-Level United Nations Conference on South-South Cooperation, Buenos Aires ("BAPA+40 outcome document"), adopted in March 2019, (UN 2019a) made significant contributions towards providing guidance for development partnerships in the context of SSTC in alignment with the economic and political transitions that have taken place since the adoption of the Buenos Aires Plan of Action (BAPA), in (UN 1978).

The "BAPA+40 outcome document" welcomes, inter alia, the Paris Agreement – adopted in December (UNFCCC 2015a) by the Conference of the Parties to the United Nations Framework Convention on Climate Change (UNFCCC) at its twenty-first session, designed to trigger greater levels of action and ambition among the Parties to combat climate change in a cooperative manner. It also recalls the New Urban Agenda,(UN 2016a) adopted by the United Nations Conference on Housing and Sustainable Urban Development in October 2016, which sets a shared 20-year vision for sustainable development of cities and municipalities in an integrated manner, and refers to other relevant major United Nations conferences and summits in the economic, social and related fields.

Since 1978, when the first BAPA was adopted, the world has witnessed significant changes, including the emergence of an issue that has been increasingly recognized as the most significant challenge currently faced by humankind: the changing climate, which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere, and which is in addition to the natural climate variability observed over comparable time periods.

Climate change is a fundamental threat to development. Its impacts cut across boundaries and across dimensions – including the political, economic, social and spatial – with strong linkages to issues such as livelihood, energy transformation, health, food/nutrition, and water security. In the context of the implementation of the Paris Agreement under the United Framework Convention on Climate Change (UNFCCC), SSC is implicitly seen as a means by which developing countries could voluntarily assist each other in undertaking their climate change actions, in the context of sustainable

2 Information on all SDGs is available at: https://sustainabledevelopment.un.org.

development and poverty reduction.[3]

Accelerated urbanization was a defining characteristic for human settlements during the 20th century, and future projections indicate the continued trend of urban growth during the first half of the 21st century. The scale and pace of urbanization is unprecedented, and two-thirds of global populations are expected to live in cities by 2050, with the most significant urban growth expected in Asia and Africa. Improving how cities are planned and managed, as well as adapting urban spaces to mitigate the adverse effects of climate change, will undoubtedly be critical issues in the coming years and decades.

The BAPA+40 outcome document also "recognizes trends towards rapid urbanization in developing countries and calls for greater South-South and triangular cooperation initiatives aimed at the eradication of poverty in all its forms and dimensions in urban and rural areas, through more coordinated policies and sharing knowledge, solutions and experience, by raising the productivity, resilience and sustainability at the local level, including of urban centres, where 68 per cent of the world's population is projected to live by 2050."

The BAPA+40 outcome document states that "an important means to this end is sharing good practices in participatory urban planning and management". This is the reference that has inspired this publication and highlighted the catalytic role of SSTC at the sub-national level in sharing experience in this regard.Moreover, the New Urban Agenda (NUA) features an explicit link to SSTC.It recognizes the need to "expand opportunities for North-South, SSTC and international cooperation, as well as subnational, decentralized and city-to-city cooperation, as appropriate, to contribute to sustainable urban development, developing capacities and fostering exchanges of urban solutions and mutual learning at all levels and by all relevant actors."[4]

This report highlights the importance of sharing knowledge, practices, experiences, on a voluntary basis, in the implementation of the 2030 Agenda and in the pursuit of sustainable development. It is intended as a knowledge resource to facilitate SSTC. By providing an insight into practical and effective development solutions adopted by Southern cities to combat climate change and foster sustainable development, it aims to enhance knowledge sharing and cooperation so that successes can be adapted, replicated and scaled up by other cities.

More than two-thirds of global populations are expected to live in cities by 2050.

Cities are responsible for 80% of global CO2.

(Source: HABITAT III)

Cities are at the frontier of transformation and could deliver sustained and inclusive growth and development outcomes for their inhabitants.An integrated approach to urban planning and management, backed by innovation and finance, are therefore critical to enabling cities to optimize the benefits of urbanization whilst securing a sustainable, climate-resilient and low-emission future.

Collaboration among developing countries is increasingly seen as a key means of delivering quality solutions to the common challenges from urbanization and climate change. National governments are progressing their own agendas to address the challenges of urbanization, but collective and collaborative action can help to accelerate progress towards development outcomes.

3 The Paris Agreement, adopted in 2015, builds on the UNFCCC. See, e.g., Art. 7(7); Art. 9(2); Art. 11(4); Art. 12. at https://unfccc.int/resource/docs/2015/cop21/eng/l09r01.pdf

4 http://habitat3.org/wp-content/uploads/NUA-English.pdf

The main premise is that SSC can be a powerful way for cities/countries from the Global South to exchange, pool and harness knowledge about solutions developed in similar contexts and therefore better suited to their local development needs.The concept of SSC in the urban space has evolved from city-twinning models and now extends to a broader framework at bilateral, regional, intra-regional or inter-regional level. By promoting an agenda of collaborative action, cities will be better placed to harness a wider knowledge base, engage with a wider set of experts through national and international networks, and leverage resources from the public and private sectors.

International attention and commitments to sustainable cities provide the impetus to step up action..

Objective, structure and scope

The objective of this publication is to identify good practices and emerging solutions about how cities in developing countries are managing their urban spaces in the context of climate change and sustainable development. In an effort to encourage SSTC, this report presents case studies from cities in developing countries in Africa, Asia and Latin America, focusing on how multi-stakeholder cooperation is integral to enhancing efforts to mitigate and adapt to climate change, thereby supporting the implementation of the Paris Agreement within the UNFCCC and achieving targets under the 2030 Agenda for Sustainable Development.

The report is structured in four sections. Following this introductory Section I, the following Section II outlines the evolution of SSTC in the context of the 2030 Agenda and challenges related to climate change, as well as the New Urban Agenda against the backdrop of the evolving global context and the challenges posed by urban development, particularly for the Global South;

Section III illustrates diverse experiences and good practices drawn from cities primarily across the three regions of Africa, Asia and Latin America. It seeks to understand how local and subnational governments are dealing with the challenges of climate change and sustainable development, and also which social, economic, environmental, political and legal conditions can lead to the most effective responses. It looks at the diversity of approaches that cities are taking to find sustainable solutions by involving stakeholders across disciplines, drawing on evidence to inform policies and to design and implement programmes on management of the urban space.In particular, the case studies reflect on how these approaches are leading to lower greenhouse gas emissions and increased climate resilience, as well as the achievement of the 2030 Agenda on Sustainable Development.The case studies also provide examples of how SSTC is being applied to further efforts towards sustainable urban development.

Section IV reflects on the conclusions and the way forward.

The report acknowledges that there are numerous initiatives, including those supported by development agencies, working to support resilient cities.Most notably, these include: the Global Platform for Sustainable Cities (GPSC); the World Bank Group's City Resilience Program (CRP); C40 Cities; United Nations Environment Programme's (UNEP) Climate Neutral Network; the Joint Work Programme between UNEP, the World Bank, UN-Habitat, in partnership with Cities Alliance; Global Environment Facility's (GEF) Sustainable Cities Program; the 100 Resilient Cities (100RC) program; Asian Cities Climate Change Resilience Network (ACCCRN), United Cities and Local Governments (UCLG), various regional-level Cities Networks, a host of initiatives and programmes by United Nations Office for South-South Cooperation (UNOSSC), United Nations Development Programme

(UNDP), United Nations Industrial Development Organization (UNIDO), UN-Habitat, United Nations Economic and Social Commission for Asia and the Pacific (UN-ESCAP), United Nations Population Fund (UNFPA), Food and Agriculture Organization (FAO) and International Labour Organization (ILO); and, several other notable initiatives by governments, bilateral and multilateral agencies, global, regional and local institutions, and other stakeholders which may not have been included in the case studies featured in this report.

This report does not aim to evaluate or assess the performance of any individual programme or effort. Instead, it focuses on highlighting the value of SSTC as a means to enable developing countries to take on stronger roles in building urban resilience, so that good practices and lessons can be shared more widely.

Methodology

This report was conceptualized and developed in-house by the United Nations Office for South-South Cooperation (UNOSSC), in partnership with the Inter-American Institute for Global Change Research (IAI). Most of the case studies were co-authored by local city authorities, in many cases working in conjunction with national scientists and experts in an evidence-based approach. Some of the cases were also authored by UN entities and other international organizations, in consultation with implementing partners.

Report development process

This report was developed by an iterative process overa period of six months. The process included a survey circulated by ICLEI –Local Governments for Sustainability and made available on the UNOSSC website. Through an open call for proposals via the UNOSSC website, cities were invited to submit their individual experiences and good practices by means of responses to a structured survey questionnaire developed by the UNOSSC team. The survey was designed to collect information on how cities in different regions around the world are designing and implementing policies and programmes on urban planning and management that could lead to lower greenhouse gas emissions and to building climate resilient approaches, as well as the achievement of the 2030 Agenda on Sustainable Development. The overall approach sought to understand which social, environmental, economic and governance conditions could lead to the most effective responses. It drew on emerging evidence that demonstrates clear and positive outcomes in terms of climate change mitigation and adaptation measures.

In-depth desk research and consultations with Member States, UN entities and other international organizations were undertaken to identify additional case studies to ensure broad coverage of different geographical regions, cooperation modalities and focus areas. These case studies were co-authored in consultation with contributing governments, including at local level, organizations, networks and academic institutions. Case studies were subject to a peer-review process by UNOSSC, and external experts. The report was also the subject of peer review by UN-Habitat representatives.

Acknowledged limitations

The sample of case studies outlined in this report should be considered as illustrative of the range and diversity of activities that developing countries are undertaking in relation to SSTC on climate change and urban sustainable development. It is acknowledged that there are certainly a multitude of other activities being undertaken in numerous cities in developing countries that have not been

included in this report. The report therefore presents a comprehensive, but by no means exhaustive, overview of current SSTC initiatives related to urban planning and management and its impacts in addressing climate change and fostering sustainable development.

Acknowledged limitations include:

- *Availability of literature:* The report team was predominately only able to access information about activities, cases and programmes that was publicly available online. In addition, the review of the literature was restricted to publications written in English, Spanish and Portuguese.
- *Research strategy:* This report is not intended to be a systematic review. The research team did attempt to be systematic and identify as many as relevant reports and papers as possible, but, inevitably, some activities, cases and programmes will have been omitted. There may be additional activities, cases and programmes that are being undertaked but have not been reported on, and therefore they do not appear in this report.

Despite of the acknowledged limitations, this report aims to present a common, practical and flexible approach to enable the future incorporation of lessons learned and good practices related to SSTC on urban planning and management and its impacts in addressing climate change and fostering sustainable development.

Continuous sharing of good practices and experiences in SSTC

Given the mandate and the central role of the United Nations Office for South-South Cooperation, it serves as the focal point for promoting and facilitating SSTC for development on a global and United Nations System-wide basis. UNOSSC is committed to promoting SSTC approaches to sustainable development and support to Member States in building partnerships and sharing of good practices and experiences.

To address the increasing impact of climate change, the UNOSSC also leads and coordinates the efforts of UN to enhance SSTC on climate actions in supporting the implementation of the United Nations Secretary-General's Climate Change Engagement Strategy.

New examples and best practices can be featured through the South-South Galaxy– a global knowledge sharing and partnership brokering platform for SSTC, to promote and scale up best practices for the benefit of developing countries.[5]

5 http://www.southsouth-galaxy.org/

II. GLOBAL CONTEXT FOR CITY-TO-CITY PARTNERSHIPS, AND SOUTH-SOUTH AND TRIANGULAR COOPERATION ON URBAN PLANNING AND MANAGEMENT

A. Evolution of SSTC: Entering a new era guided by the BAPA+40 outcome document

South-South cooperation is "a process whereby two or more developing countries pursue their individual and/or shared national capacity development objectives through exchanges of knowledge, skills, resources and technical know-how and through regional and interregional collective actions, including partnerships involving Governments, regional organizations, civil society, academia and the private sector, for their individual and/or mutual benefit within and across regions. South-South cooperation is not a substitute for, but rather a complement to, North-South cooperation" "Triangular cooperation involves Southern-driven partnerships between two or more developing countries supported by a developed country(ies)/or multilateral organization(s) to implement development cooperation programmes and projects" (UN 2016c).

The emergence of SSC can be traced to the 1955 Bandung Conference where 25 newly independent African and Asian nations met to foster political and economic cooperation. This evolved into the Non-Aligned Movement in 1961, enabling developing countries to maintain a neutral stance during the Cold War. However, it was the Buenos Aires Plan of Action (BAPA) for promoting and implementing technical cooperation among developing countries, adopted in 1978, that effectively set the tone for the emergence of SSC as an instrument for fostering development and as a complement to traditional North–South development cooperation (Uneze, Ebere 2015).[6]

The need for strategic and united collective action on the part of developing countries in the international arena has long been recognized. From the Buenos Aires Plan of Action for Promoting and Implementing Technical Cooperation among Developing Countries adopted at the United Nations Conference on Technical Cooperation among Developing Countries, in 1978, to the Second High-Level UN Conference on South-South Cooperation, Buenos Aires, 20 to 22 March 2019 (BAPA+40), forty years later, SSC has been an essential element in the South's development process and in multilateral North-South dialogue and global governance.

SSC has increasingly become an essential element of how developing countries cooperate to support each other's development. Its principles and concepts serve as important benchmarks for shaping not only South-South but also, to some extent, North-South relations at global, regional, and national level. They have also shaped the ways in which the countries of the Global South have sought their respective development goals and objectives.

Countries from the Global South further refined the framework and principles for SSC through the Havana Programme of Action adopted at the first South Summit in (G77 2000), the Marrakech Framework of Implementation of SSC in (G77 2003), and the Doha Plan of Action adopted at the second South Summit in (G77 2005).

6 Impact of South-South Cooperation in achieving the Millennium Development Goals (MDGs) in Low-Income Countries. p.3. Available at: https://ec.europa.eu/europeaid/sites/devco/files/erd5-background-paper-ssc-impact-2015_en.pdf

In December 2009, the High-level United Nations Conference on South-South Cooperation, Nairobi, gave a major political boost to SSTC. The 2009 Nairobi outcome document sets forth the rationale, principles and key actors of SSC and requests UN System organizations to make additional efforts to ensure that they meet Member States' expectations regarding support for such cooperation. (UN 2009, paras. 18 and 19).

The 2016 revised version of the Framework of operational guidelines on United Nations support to SSTC reaffirms most of the points of the 2009 Nairobi outcome document and refers to SSC as "a common endeavour of peoples and countries of the South, born out of shared experiences and sympathies (…)".

SSC has grown in relevance in the past decade and has been a subject of discussion at a number of major United Nations conferences and other conferences. This surge in interest is due largely to the increasing economic power of the Global South, the extensive and relevant development know-how and solutions generated by developing countries and the increasing evidence of the contribution of SSC to successful development in many countries.

Taking note that SSC is as an important element of international cooperation for development, as well as recognizing the increased role undertaken by the United Nations in supporting economic and technical cooperation activities among developing countries as well as other forms of triangular cooperation, a UN General Assembly Resolution, adopted in August 2017, decided to convene the Second High-level United Nations Conference on South-South Cooperation in Buenos Aires from 20 to 22 March 2019 (UN 2017a).

The Buenos Aires outcome document of the second High-level United Nations Conference on South-South Cooperation (hereinafter BAPA+40 outcome document) reaffirms and updates the rationale and principles of SSC as follows (UN 2019a):

> *"(…) we reaffirm our view of South-South cooperation as a manifestation of solidarity among peoples and countries of the South that contributes to their national well-being, their national and collective self-reliance and the attainment of internationally agreed development goals, including the Sustainable Development Goals, according to national priorities and plans. South-South cooperation and its agenda have to be set by countries of the South and should continue to be guided by the principles of respect for national sovereignty, national ownership and independence, equality, non-conditionality, non-interference in domestic affairs and mutual benefit" (UN 2019a, para. 8).*

Taking into account these principles, the modalities and mechanisms for promoting SSC "can take place in a bilateral, regional or interregional context", bearing in mind that it is conducted among countries of the South (UN 2019a, para. 7). The BAPA+40 outcome document also reaffirms the importance of triangular cooperation and recognizes "that triangular cooperation complements and adds value to South-South cooperation by enabling requesting developing countries to source and access more, and a broader range of, resources, expertise and capacities, that they identify as needed" (UN 2019a, para. 12).

Developing countries have continually stressed that SSC is a complement to, and not a substitute for, North-South development cooperation (UN 2019a, para. 10). SSC is therefore seen by developing countries as being conceptually different from traditional North-South Official Development Assistance (ODA), given the **"voluntary, participative, and demand driven nature of South-South Cooperation, born out of shared experiences and sympathies, based on their common**

objectives and solidarity" (UN 2019a, para. 9).

The BAPA+40 outcome document is a recognition that SSTC has become an essential element of international cooperation. It not only speaks to the past and the present of SSTC, but also considers its future. Since the Buenos Aires meeting in 1978, the increasing economic dynamism of some developing countries in recent decades has imparted greater energy to SSC, including through regional integration initiatives across the developing world. Thus, the BAPA+40 outcome document notes that SSC has expanded the number of relevant actors and scope, taken different and evolving forms, provided innovative approaches for collective actions, and experienced incremental institutionalization (UN 2019a, paras. 16, 18, 19 and 20). At the same time, the document also acknowledges that developing countries continue to face serious development challenges, as well as new and emerging challenges (UN 2019a, 17).

While the BAPA+40 outcome document reiterates that every country has the primary responsibility for its own development, it also reaffirms "the key role of the United Nations funds, programs, specialized agencies, non-resident agencies, UN Regional Commissions, including UN country teams in supporting and promoting South-South cooperation and triangular cooperation (UN 2019a, Paragraph 21)" and stresses the need to reinvigorate the UN development system in supporting SSTC(UN 2019a, para. 27).[7]

Moreover, the BAPA+40 outcome document presents elements that could strengthen and bolster SSTC, as well to enhance its effectiveness and create enabling environments to improve SSTC prospects for the future (UN 2019a, paras. 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35 and 36). The outcome document, which is both technical and aspirational, calls on countries and relevant stakeholders to promote economic, social and environmental dimensions of sustainability, including in all SSTC policies and activities. There is also a call on multilateral, regional and bilateral financial and development institutions to consider increasing financial resources and technical cooperation to promote SSTC.

The UN development system is called upon to assist developing countries in building the human and institutional capacity needed to formulate and implement national SSTC development policies, strategies and programmes. Member States are encouraged to increase the use of triangular cooperation.Countries that have established institutions with leading expertise in science, technical and innovation are called to consider providing more scholarships which will enable students and young scientists, including women and girls, from Southern countries to gain greater access to such institutions for higher studies and research. Member States are also encouraged to share knowledge, expertise and best practices on public-private partnerships, including risk assessment and regulatory frameworks (UNOSSC 2019).

Last but not the least, as the world works towards the implementation of the 2030 Agenda and the achievement of the SDGs, the BAPA+40 outcome document reaffirms the significant role to be played by SSTC in this regard (UN 2019a, paras. 1, 2, 6, 17, 23, 24, 27, 28 and 31). Furthermore, the outcome document also recognizesthe increasing importance of SSTC in addressing borderless challenges faced by the entire world, but which have a disproportionate impact on the Global South, which will be considered in the following sections.

7 Ibid., paragraph 27.

B. South-South and triangular cooperation in the context of the sustainable development

SSC in the overall context of multilateralism is vital in confronting the challenges to the South. It is a valuable contribution to development efforts and, as such, needs to be strengthened. It is essential as a strategy to sustain the development efforts of developing countries, particularly in the context of the significant changes that have been taking place in international political and economic relations in recent decades.

SSC can help to navigate risks and leverage opportunities for sustainable development. Uncertain global, regional, and domestic economic conditions, combined with the adverse effects of climate change and environmental degradation, as well as old and new social challenges, including efforts to eradicate poverty, present both significant risks and opportunities for enhanced SSC.

The risks are that, given weaker sustained economic growth, a net outflow of financial resources, a greater level of global income inequality and greater development challenges related to social and environmental dimensions, developing countries could limit or reduce the resources that they make available for SSC.

On the other hand, opportunities for enhanced SSC may arise if developing countries, in the face of weakening levels of multilateral cooperation between developed and developing countries, shift to focus their international cooperation efforts on working with each other. Nevertheless, it is worth recalling that SSC cooperation must not be seen as a substitute for North-South cooperation.

The confluence of climate change impacts, environmental degradation, rising inequalities within and among countries, and uncertain global economic conditions point to the need for enhanced international and SSC, including the provision of financial resources, technology, and capacity-building support. Moreover; such cooperation needs to be substantially scaled up and channelled to developing countries, especially those particularly vulnerable to the current challenges.

SSC has been seen as an important element of international cooperation for development that offers viable opportunities for developing countries in their individual and collective pursuit of sustained economic growth and sustainable development.

There have been progressive steps towards multilateral cooperation on sustainable development in recent years, and the year 2015 was an important milestone in this regard, as can be seen in the figure below. The challenge, however, is for the global community and for the South to be able to generate the sustained high level of political will necessary to address the systemic structural issues that adversely affect social and environmental standards at global and regional level and enable greater cooperation to address weak economic conditions and other barriers to development.

Figure 1: "Important Multilateral Conferences in 2015"

The 2030 Agenda recognizes that, in an interconnected world, development goals and challenges need to be addressed through international cooperation. The 17 SDGs with a total of 169 targets highlight and showcase the interlinkages between the economic, social and environmental dimensions of sustainable development, and the ways these interlinkages can be used to create positive synergies between the actions under each dimension(UN 2015a).

SDG 17, in particular, calls on the Member States of the United Nations to "strengthen the means of implementation and revitalize the global partnership for sustainable development." The goal has specific targets for international cooperation, which include the mobilization and provision of finance to developing countries; technology cooperation, facilitation, development and transfer; capacity-building (including a reference to North-South and SSTC); increasing international trade from developing countries; and addressing systemic issues (including enhancing policy and institutional coherence, global partnerships, and data monitoring and accountability).

The 2030 Agenda, in its SDG 13, urges the international community to "take urgent action to combat climate change and its impacts". Another key instrument, also adopted in 2015 was the Paris Agreement, which builds on the United Nations Framework Convention on Climate Change – UNFCCC, the primary multilateral framework for international cooperation on climate change. The development of the multilateral policy regime under the Convention has, since its entry into force in 1994, gone through various phases designed to trigger greater levels of action and ambition among the Parties to combat climate change in a cooperative manner (e.g. the Kyoto Protocol adopted in 1997). The Paris Agreement, "in enhancing the implementation of the Convention, including its objective, aims to strengthen the global response to the threat of climate change, in the context of sustainable development and efforts to eradicate poverty" (UNFCCC 2015a, Art. 2.1 chapeau).

The Paris Agreement seeks to accelerate and intensify the actions and investment needed for a sustainable climate-resilient and low-emission future. Its central aim is to strengthen the global response to the threat of climate change, in the context of sustainable development and efforts to eradicate poverty, including keeping a global temperature rise this century to less than 2 degrees Celsius above pre-industrial levels, and to pursue efforts to limit the temperature increase even further, to 1.5 degrees Celsius. The Paris Agreement also aims to strengthen the ability of countries to deal with the impacts of climate change.

It is widely recognized that climate change will disproportionately impact countries in the Global South, especially vulnerable populations in the least developed countries (LDCs), landlocked

developing countries (LLDCs), and small island developing States (SIDS) (IPCC 2007) Climate change scenarios generally predict increasing geophysical changes such as high surface and ocean temperatures, global sea level rise, and increased ocean acidification over the course of the twenty-first century, together with more frequent or more intense extreme weather events, with the most severe effects being felt in tropical areas, where most developing countries are located. These changes "are likely to cause an increase in poverty incidence and inequalities by slowing down economic growth and exacerbating food insecurity, health problems and heat stress; and to result in surface-water scarcity and increased exposure to storms and precipitation extremes, coastal flooding, landslides, air pollution and droughts. They may also induce displacement of people and involuntary migration, among other hardships (UNDESA 2016)."

North-South development cooperation models will not be sufficient on their own for countries to achieve the bold ambition of the SDGs and the Paris Agreement. A more diverse landscape for international cooperation is required, one that can bring together new partners and new approaches to complement longstanding North-South international development cooperation.

While North-South cooperation is the main modality for development cooperation, it has been noted in the past few decades that SSC has expanded its scope, facilitated regional, sub-regional and interregional integration, provided innovative approaches for collective actions and strengthened its contribution to sustainable development in its three dimensions (UN 2019a, para. 16).

SSC complements traditional North-South development cooperation in areas like climate change, helping to broaden the range and scope of the development partnerships in which developing countries can engage to pursue their national sustainable development priorities and objectives. The recent evolution of SSC, and the rising prominence of such cooperation on climate change, provides important lessons about its role in enhancing ownership. It also includes strengthening the capacity of developing countries in their national development efforts and working with each other in mutually supportive and beneficial ways.

SSC is a means by which developing countries can voluntarily assist each other in their climate change actions, in the context of sustainable development and poverty reduction. In addition to multilateral coordination and cooperation in the UNFCCC negotiations, many developing countries have been active in SSC activities over the past decades as part of their respective foreign and economic policy and diplomacy. In recent years, some developing countries have incorporated cooperation with other developing countries in addressing climate change impacts and challenges related to sustainable development in their South-South portfolios. Accompanying the growing political momentum, moves to address trends in climate change and sustainable development through SSC are increasingly reflected in greater cooperation on the ground (UNEOSG, 2017).

These trends are reflected in the BAPA+40 outcome document, which not only welcomes all these instruments and recalls other relevant major United Nations conferences and summits in the economic, social and related fields, but makes clear that the overarching theme of such a conference isthe "Role of South-South cooperation and implementation of the 2030 Agenda for Sustainable Development: challenges and opportunities", recalling Resolution 71/318 adopted by the General Assembly on 28 August 2017 (UN 2017a).

The BAPA+40 outcome document recognizes "that South-South and triangular cooperation contribute to the implementation of the 2030 Agenda for Sustainable Development and to achieving the overarching goal of eradication of poverty in all its forms and dimensions, as it shares the

comprehensive vision of development contained in the 17 Sustainable Development Goals, that balance the three dimensions of sustainable development – the economic, social and environmental" (UN 2019a, para. 6).

Moreover, the document acknowledges that "developing countries continue to face serious challenges, as well as new and emerging challenges, in the implementation of the 2030 Agenda for Sustainable Development", and it recognises "the need to enhance capacity in developing countries by enhancing resources, and by building local capabilities, institutions, expertise, human resources, where appropriate, in contribution to national development priorities, at the request of developing countries (UN 2019a, para. 17)."

C. Global sustainable development landscape and urban planning and management

It is widely recognized that the year 2015 was pivotal for sustainable development, with moves to shape the sustainable development agenda for the coming decades. The following year was of paramount importance for urban sustainability. The UN Conference on Housing and Sustainable Urban Development (Habitat III) took place in Quito, Ecuador, from 17-20 October 2016. Like the BAPA Conference, following the bi-decennial format, the first Habitat conference was held in Vancouver in 1976, and Habitat II followed 20 years later in 1996, in Istanbul. The main outcome document of the Habitat III was the "New Urban Agenda".

Habitat III was the first global conference on urban issues following the adoption of the 2030 Agenda and the SDGs in 2015. Agenda 2030 already included, in its SDG 11, a call for the international community "to make cities and human settlements inclusive, safe, resilient and sustainable".Habitat III was significantly influenced by the outcomes of the multilateral processes in the previous year, notwithstanding the fear, during the preparatory process of Habitat III, that its outcomes would be eclipsed by the focus on the SDGs and UNFCCC processes (Cities Alliance, 2015).

Undoubtably, there are significant potential overlaps between the SDGs and the New Urban Agenda. The SDG 11 is the most obvious urban component of the set of global goals. The inclusion of SDG 11 on sustainable cities and human settlements as one of the Global Goals is recognition of the relevance of urbanization to development. Highlighting the contributions of cities and communities to social inclusion, economic growth and environmental protection can help increase support for sustainable urban development policies. In recent years there has been a shift in the way cities are perceived; previously seen as a source of problems, they are now increasingly seen as offering solutionsin the transition towards sustainability.

Moreover, the inclusion of other urban related issues in the targets and indicators of other SDGs, and the fundamental role of local actors in achieving more than half of the SDG targets, highlight the strong urban content of the 2030 Agenda (Misselwitz, Philipp et al 2015). Although linkages are not clearly defined within the SDGs and are open to interpretation, according to a Cities Alliance Discussion Paper, 10 of the 17 SDG goals are linked to SDG 11; 30 percent of the overall targets are linked to SDG 11 (12 percent explicitly and 18 percent implicitly) and 39 percent of indicators are linked to SDG 11; 21 percent of the targets can only be implemented with local actors; and 24 percent should be implemented with local actors (Cities Alliance, 2015, pp. 17 and 19).

Regardless of these exercises to identify the linkages, it is important to acknowledge that the SDGs are integrated and indivisible and balance the three dimensions of sustainable development: the **economic, social and environmental (UN 2015a)**. The New Urban Agenda highlights how these themes are reflected in the territory, in the space, and the importance of urban form in strengthening the opportunities of cities.

The Preamble of the New Urban Agenda reaffirms the more positive perspective of the linkages between the 2030 Agenda and the New Urban Agenda, which complements rather than duplicates the SDGs.The Preamble goes on to state that its implementation "contributes to the implementation and localization of the 2030 Agenda for Sustainable Development in an integrated manner, and to the achievement of the Sustainable Development Goals and targets, including Goal 11 of making cities and human settlements inclusive, safe, resilient and sustainable." Most importantly, it "reaffirms our global commitment to sustainable urban development as a critical step for realizing sustainable development in an integrated and coordinated manner at the global, regional, national, subnational and local levels, with the participation of all relevant actors (UN 2016a)" The New Urban Agenda outlines the paths cities can take to achieve the SDGs.

One important component of the New Urban Agenda (NUA) is the fact that sub-national and local governments are acknowledged as key players in addition to national governments. By giving responsibility to all levels of government and rooting urban development in local and regional contexts, sustainable urban development can be implemented in a vigorous and renewed manner. Moreover, the NUA emphasises the importance of the role of participatory and "bottom-up" practices, including public participation in all aspects of urbanization, shared input by communities, and a comprehensive range of stakeholders (e.g. private sector companies and academics) (UN-Habitat 2016).

The NUA also emphasises and brings several new nuances. For the purpose of this publication, a specific element of the NUA should be highlighted: "Planning and Managing Urban Spatial Development", which is included in the section on "Effective Implementation" of the Agenda.An enabling policy framework is required at national, subnational and local level in order to "implement integrated planning that aims to balance short-term needs with the long-term desired outcomes of acompetitive economy, high quality of life and sustainable environment (UN 2016a, para. 94)". The NUA also highlights the importance of integrating "disaster risk reduction and climate change adaptation and mitigation considerations and measures into age- and gender-responsive urban and territorial development and planning processes, including greenhouse gas emissions, resilience-based and climate effective design of spaces, buildings and construction, services and infrastructure, and nature-based solutions (UN 2016a, para. 101)." Integrated and complementary processes and actors, such as participatory planning, coordination of urban and rural development strategies, and international cooperation have the potential to foster the implementation of the NUA, along with system-wide coordination within the United Nations System.

The conceptual underpinnings of urban planning and management are mainly related to public spaces. The importance of public spaces to sustainable development is acknowledged in the 2030 Agenda, in target 11.7., which states that "universal access to safe, inclusive and accessible, green and public spaces, in particular for women and children, older persons and persons with disabilities" should be provided by 2030. Advocacy for the central role of public spaces in the NUA was highlighted during the preparatory process, as they are considered a key driver in achievingthe "collective aspiration for more sustainable, just and democratic cities and human settlements, for

all temporary and permanent inhabitants and users of the city, whether they live there legally or informally (UN-Habitat 2016)."[8]

The approach of placing housing at the centre is an important aspect that is highlighted in the NUA, which states that "We will promote the implementation of sustainable urban development programmes with housing and people's needs at the centre of the strategy, prioritizing well located and well distributed housing schemes in order to avoid peripheral and isolated mass housing developments detached from urban systems, regardless of the social and economic segment for which they are developed, and providing solutions for the housing needs of low-income groups".[9] According to UN-Habitat, housing at the centre aims to "shift the focus from simply building houses to a holistic framework for housing development, orchestrated with urban planning practice and placing people and human rights at the forefront of urban sustainable development".[10]

The NUA recognizes that its implementation "requires an enabling environment and a wide range of means of implementation". This includes "enhanced international cooperation and partnerships among Governments at all levels, the private sector, civil society, the United Nations System and other actors, based on the principles of equality, non-discrimination, accountability, respect for human rights and solidarity, especially for those who are the poorest and most vulnerable (UN 2016a, para. 126)."[11]

In 2017, the United Nations General Assembly, in its Resolution on South-South cooperation,[12] welcomed the New Urban Agenda, and urged the United Nations to continue to support SSC projects that contribute to the implementation of this Agenda. In 2018, a report of the Secretary-General on the role of SSC and the implementation of the 2030 Agenda (UN 2019b) pointed out that more and more actors have engaged themselves with South-South and triangular cooperation, including, notably, subnational entities such as municipal and provincial governments.

The BAPA+40 outcome document welcomes, *inter alia*, the New Urban Agenda and recalls other relevant major United Nations conferences and summits in the economic, social and related fields. Paragraph 32 of the BAPA+40 outcome document makes specific reference to urban challenges. It recognizes "trends towards rapid urbanization in developing countries" and calls for "greater South-South and triangular cooperation initiatives aimed at eradication of poverty in all its forms and dimensions in urban and rural areas through more coordinated policies and sharing of knowledge, solutions and experience, by raising the productivity, resilience and sustainability at the local level, including of urban centres where 68 per cent of the world's population is projected to live by 2050." Having said that, the document highlights that an "important means to this end is sharing of good practices in participatory urban planning and management (UN 2019a, para.32)."

The great majority of local governments are not in a position to implement SDG 11 and related targets or the NUA effectively, either because they lack adequate financial and technical capacities, or because legal, fiscal and institutional regulations are a constraining influence. Both the SDGs and the NUA need robust monitoring and support mechanisms to facilitate their implementation.

8 A/CONF.226/PC.3/11, "Preparatory Committee for the United Nations Conference on Housing and Sustainable Urban Development (Habitat III), Third session Surabaya, Indonesia, 25-27 July 2016 Habitat III thematic meeting on public spaces", 3 June 2016. See also the issue paper on public spaces and the report of Policy Unit 6, entitled "Urban spatial strategies: land market and segregation", all of which concur with the following definition of public spaces: "Public spaces are all places, including streets, publicly owned or of public use, accessible and enjoyable by all for free and without a profit motive".

9 http://habitat3.org/wp-content/uploads/NUA-English.pdf

10 https://unhabitat.org/housing-at-the-centre-of-the-new-urban-agenda/

11 New Urban Agenda, paragraph 126.

12 UN General Assembly, Resolution 72/237, South-South Cooperation, adopted on 20 December 2017.

It is important to recognize the different history and particularities of SSC, as well as those of the different institutional arrangements at national level. Acknowledging that "South-South cooperation and its agenda have to be set by the countries of the South and should continue to be guided by the principles of respect for national sovereignty, national ownership and independence, equality, non-conditionality, non-interference in domestic affairs and mutual benefit (UN 2019a, para. 8)" is not sufficient to affirm that city-to-city partnerships at international level are an expression of SSC.Indeed, it is beyond the scope of this publication to assess how devolved and/or federated governments regulate the eventual cooperation of subnational and local government stakeholders in external-relations activities.

Summing up, both the 2030 Agenda (mainly through SDG 17) and the NUA (mainly paragraph 146) take a positive view of North-South, South-South and triangular cooperation as a means of implementation. This perspective, strengthened by the BAPA+40, unveils new possibilities for SSTC to support the improvedurbanization and sustainable urban development.

D. South-South and triangular cooperation and subnational and local coordination mechanisms: The role of cities

The BAPA+40 outcome document reflects the evolution of SSC and sets out a path for the future. It opens up a range of possibilities to further expand the horizons of collaboration and recognizes "that South-South cooperation is conducted among countries of the South, including but not limited to the economic, social, cultural, environmental and technical domains (UN 2019a, para. 7)".

The BAPA+40 outcome document also notes that "South-South Cooperation has expanded its scope, (…) provided innovative approaches for collective actions and strengthened its contribution to sustainable development in its three dimensions." Moreover, the document acknowledges that there "has been an expansion of the number of relevant actors in development, including multiple stakeholders, subnational entities and parliamentarians, civil society, the private sector, volunteer groups, faith-based organizations, philanthropic organizations, scientific and technical communities, foundations, think tanks and academia, as appropriate (UN 2019a, para. 16)."

The reference to subnational entities in the BAPA+40 outcome document is significant, especially in the perspective of this report. As mentioned previously, recognizing "trends towards rapid urbanization in developing countries", the document calls "for greater South-South and triangular cooperation initiatives (…) through more coordinated policies and sharing knowledge, solutions and experience". It goes on to state that "an important means to this end is sharing good practices in participatory urban planning and management (UN 2019a, para. 32)", which is the reference that has inspired this publication.

As stated in the outcome document of the BAPA+40 Conference, "**developing countries tend to share common views on national development strategies and priorities when faced with similar development challenges.** The proximity of experience is therefore a key catalyst in promoting capacity development in developing countries and, in this regard, it accentuates the principles of SSC. It is important to enhance SSC in order to fulfil its full development potential (UN 2019a, para. 13)." It cannot be different at subnational and municipal level, regarding local development strategies, priorities and challenges.

The BAPA+40 Conference not only increased the number of stakeholders in the context of SSTC, but also its scope, increasingly taking "different and evolving forms, including technical cooperation, the sharing of knowledge and experience, training, capacity building and technology transfer on mutually agreed terms, aimed at achieving sustainable development through the promotion of, *inter alia*, economic cooperation, including trade, investment, infrastructure development and connectivity, agriculture and rural development, food security and nutrition, food safety, health, energy, disaster risk reduction, addressing climate change, as well as mutual learning and the coordination of development policies and strategies among developing countries (UN 2019a, para. 18)."

Although national governments are the primary stakeholders in the context of SSTC, it cannot be denied that **there is an increasing sub-national, decentralized and city-to-city cooperation taking place at regional and international level**, aimed at contributing to sustainable urban development, developing capacities and fostering exchanges of urban solutions and mutual learning at all levels and by all relevant actors.Across continents, cities have been engaging in trade of goods and services since the 15th century, when the first voyages of explorationtook place, connecting different continents. There has also been less tangible (but no less important) exchanges by means of cultural aspects and sharing of knowledge and experience. Over the last two centuries, such exchanges have grown remarkably, completely transforming the global scenario. But the advent of information and communication technologies over the last three decades has proved conducive to strengthening the city-to-city cooperation at the international level,thereby contributing to local well-being and collective self-reliance.

Innovative responses to the current global challenges are coming from countries in the Global South who are becoming strategic partners for other developing countries. Equally important, is the strategic role of cities, from which a significant share of these innovative responses is emerging, in the international development agenda.

Urban development initiatives and city-to-city partnerships, based on the principle of solidarity and non-conditionality, have been gaining international visibility and there is an increasing will to learn from each other's good practices and case studies within a SSTC framework. Although the awareness that there is no "one-size-fits-all solution" in the context of mainstreaming sustainable development policies, stakeholders have been eager to listen to, and learn from, successful initiatives that have been developed in contexts similar to their own, and, therefore, better adapted to their realities.

Population growth, multiple forms of urban poverty, increasing inequalities, spatial segregation, inadequate housing and lack of adequate basic services are some of the pressing issues in most of the municipalities in developing countries. Global challenges are being increasingly felt locally (e.g. climate change, migration and demographic trends).Hundreds of millions living in urban areas around the world will be affected by the adverse effects of climate change (e.g. reduction in habitable areas due to rising sea levels, more frequent and extreme climatic events, hotter temperatures, spread of diseases, which may worsen access to basic urban services and the quality of life in human settlements). Nevertheless, despite this "terrifying scenario", cost-effective solutions have emerged in developing country cities, and the identification of successful experiences in one country and their application and adaptation in another are increasingly taking place.

It is worth mentioning that, in many of these initiatives, **the capacity of subnational and local governments in dealing with urban challenges has been boosted by the active participation**

of other local stakeholders (e.g. public and private research institutions, private companies, including small and medium enterprises, trade unions, non-governmental organizations, etc.). While acknowledging "that governments have the principal role of coordinating and leading development efforts", also worthy of recognition is "the increasing role played by inclusive partnerships in South-South cooperation and triangular cooperation, acting as an instrument that helps to improve impact and actions in the field (UN 2019a, para. 22)".

The interest of national and international associations and organizations in city-to-city partnerships, in the context of sustainable development, has grown considerably, as have initiatives led by city leaders. This trend has enabled city-to-city exchanges on matters related to urban sustainable development to enlarge both in scope and in practice. City-to-city partnerships have been identified as a potentially cost-effective component of achieving sustainable development and dealing with the adverse effects of climate change. Such experiences have enabled local stakeholders to exchange knowledge and solutions on a peer-to-peer basis, as well as transfer and adapt successful practices to new contexts (ILO 2013).

E. The role of other actors in supporting South-South and triangular cooperation in cities

As cities step up to identify and take action on present and future urban challenges – especially climate change, there are a multitude of forums, agencies, networks and resources supported by intergovernmental bodies, multilateral and bilateral agencies, coalitions and other institutions, working in innovative ways to support these efforts through SSTC. The following examples are not meant to be exhaustive but give a flavour of the **types of city-to-city / SSTC initiatives supported by various actors that are helping cities to move away from business as usual**.

(i) Diplomacy and Voice:Institutional networks are increasingly engaging with cities to help empower them and raise their voices in order to enhance focus on the urban agenda in international forums.For instance a new **Urban 20** (U20)[13] initiative, launched in 2017, is promoting dialogue and cooperation between 25 global cities and G-20 nations, highlighting the expertise of cities across a range of global development issues.The U20 Forum is co-chaired by the Mayors of Buenos Aires and Paris and convened by the C40 Cities Climate Leadership Group (C40) in collaboration with United Cities and Local Governments (UCLG).The World Urban Forum **(WUF)**,[14] established by the United Nations and convened by UN-Habitat, provides an international forum for promoting debate and raising awareness on sustainable urbanization, improving collective knowledge and exchange of best practice, and increasing coordination and cooperation to advance sustainable urbanization. In 2018, the Ninth WUF, "Cities 2030 – Cities for All: Implementing the New Urban Agenda" was held in Kuala Lumpur; and, WUF10 is scheduled to take place in Abu Dhabi in 2020.

(ii) Promoting the New Urban Agenda, maximizing global and local perspectives. Fostering greater participation of non-state actors and adopting more holistic and integrated approaches to urban development, rather than sector-specific solutions, is increasingly being promoted by international agencies.

13 http://www.urban20.org/
14 https://wuf.unhabitat.org/

The **Quito Implementation Platform**[15] refers to specific commitments by various partners intended to contribute to and reinforce the implementation of the outcomes of the Habitat III Conference and the NUA. Within the Urban Frameworks of the Quito Platform, the European Union made a voluntary commitment to expand opportunities for city-to-city cooperation at regional and international levels, and thereby to contribute to implementing the NUA. **The European Union's International Urban Cooperation (IUC) programme**[16] - a North-South initiative which began in June 2017, pairs EU and non-EU cities with the aim of enhancing the impact of city-to-city cooperation on sustainable urban development by strengthening the methodological basis and capacity for implementing local action planning and partnerships, including with businesses.[17]

At global level, over 9,200 cities and local governments – representing some 10% of the world's population – have committed to the **Global Covenant of Mayors for Climate and Energy** (GCoM).[18] This international coalition is committed to fighting climate change, strengthening their communities, developing their economies, and creating a sustainable future for all.Overall, the potential of these commitments, representing a population of over 780 million people, is equivalent to reducing nearly 3.7 billion tons of CO_2e emissions per year by 2030. GCoM Committed Cities are supported by an alliance of partners, among them, C40, ICLEI and UN Habitat.

To maximize both local and global perspectives, GCoM has established regional/national covenants,[19] which serve as local chapters of the broader GCoM alliance. Each engages city, subnational and national governments, community-based organizations, regional alliances and parallel initiatives to encourage and support climate action from the ground up. GCoM's regional/national covenants convene, encourage, and strengthen stakeholders at local, national, and regional level to accelerate climate action. Building on local capacity, including knowledge and networks within each region, regional covenants oversee the development of technical assistance plans for cities, ensure that the Common Reporting Framework is implemented region-wide, and recruit new cities to the alliance. For instance, the **Covenant of Mayors in Sub-Saharan Africa,**[20] with funding from the European Union, supports African cities in tackling climate and energy-related challenges, by increasing their planning capacities and providing them with a platform to share knowledge and best practice.

The **World Cities Summit Mayors Forum**[21] provides a global platform for mayors and city leaders to discuss pressing urban challenges and share best practices. It also invites senior representatives of international organizations and industry players to participate in developing integrated urban solutions and building resilience.

The Global Environment Facility's **Sustainable Cities Impact Program,**[22] launched in 2015,provides a platform for cities to draw on global best practice for a more integrated approach to sustainable urban planning, and also to share experiences with others.Financial grants (US $151.6 million) support city-level emission reduction projects. The Program currently includes 28 urban jurisdictions across 11 countries.The **World Bank Group's Global Platform for Sustainable Cities**

15 The New Urban Agenda encompasses the "Quito Declaration on Sustainable Cities for All" (including Shared Vision; Principles and Commitments; and Call for Action) and the "Quito Implementation Plan for the New Urban Agenda" (including the Transformative Commitments for Sustainable Urban Development; Effective Implementation; Follow-up and Review).More details on the Quito Declaration are available at: http://nuaimplementation.org/

16 http://www.iuc.eu

17 See http://nuaimplementation.org/commitments/fostering-city-to-city-cooperation-for-effective-implementation/

18 https://www.globalcovenantofmayors.org

19 In the Global South, these Covenants include Latin America and the Caribbean, Middle East & North of Africa, sub-Saharan Africa, South Asia, East Asia, Southeast Asia, and Oceania.

20 https://www.ccre.org/activites/view/40

21 https://www.worldcitiessummit.com.sg/event-guide/wcs-mayors-forum

22 http://www.thegef.org/news/gef-sustainable-cities-%E2%80%93-new-global-program-launched-develop-and-manage-cities-sustainably

(GPSC)[23] supports cities that take an integrated approach to urban development, including planning and financing. It provides technical advice, as well as a collaborative forum for knowledge sharing and partnerships between cities, financial institutions, non-state actorsand other key stakeholders towards achieving urban sustainability.

23 http://pubdocs.worldbank.org/en/850961461622541329/GPSC-booklet.pdf

SPOTLIGHT - UN-Habitat: Fostering solidarity and mutual learning for sustainable urbanization

UN-Habitat's commitment to mainstreaming South-South and triangular cooperation responds to the urgent need for concrete action in the implementation of Vision 2030, including SDG 11 and its targets, as well as the New Urban Agenda. This is mostly targeting countries and cities of the Global South, where urbanization rates are highest in pace and scale.[24]

Risk reduction, Kathmandu Valley, Nepal (Photo:UN-Habitat)

Programmatic initiatives

UN-Habitat's country activities for 2019[25] draw a clear picture of the Agency's massive support to urban development in the South, including strengthening policy dialogue and capacity development for institutional reforms to reduce spatial inequalities and poverty in communities across the urban-rural continuum, enhancing shared prosperity of cities and regions, strengthening climate action and improved urban environment, and supporting an effective urban crisis prevention and response.

UN-Habitat's portfolio (2014 to 2019) includes: over 210 projects in 33 African countries (US $194.1 Million) in key areas of its mandate, including urban basic services, urban land, legislation and governance, urban economy, urban planning and design, risk reduction and rehabilitation, housing and slum upgrading as well as research and capacity building. Similar efforts were undertaken in the Arab States region where 18 countries benefitted from a total number 164 projects (US $347.7 Million) in the same thematic areas.The Asia and the Pacific region included 206 projects across 23 countries (US $522.7 Million U$D), while the Latin America and the Caribbean region portfolio implemented 71 projects (US $45.8 Million) in 12 countries.

UN-Habitat's programme planning and implementation is designed in such a way as, directly or indirectly, to support mainstreaming of South-South and triangular cooperation to take account of the magnitude of the urbanization challenges facing developing countries. Opportunities are emerging particularly in major cities of the Global South, considered hubs of innovation and engines of socio-economic growth, and requiring continued massive efforts by partners at all levels to promote sustainable urbanization through technology, information, expertise, training and lesson sharing. Key Areas of engagement include urban basic services, urban land, legislation and governance, urban economy, urban planning and design, risk reduction and rehabilitation, housing and slum upgrading as well as research and capacity-building.

Advocacy and innovative partnerships

UN-Habitat and the University of Ottawa jointly helped to establish an innovative tripartite arrangement - the International Conference on Canadian, Chinese and African Sustainable Urbanization (ICCCASU), in 2014.The aim is to reflect on, and contribute to, discussions on urban challenges in China and selected African countries, in partnership with Canada.ICCCASU functions as an international think tank for exchange and cooperation on issues relating to sustainable urban development, and brings together politicians, policymakers, scholars, practitioners through a series of conferences and training workshops. It has since expanded to include a consortium of Canadian universities[26], as well as leading Chinese and African universities.

24 UN-Habitat's regional state of the cities reports (Africa, Asia, Latin America and the Caribbean, Arab, China, European cities in transition, etc.), provide key data and statistics on the current urbanization rates in different parts of the world. See www.unhabitat.org

25 http://unhabitat.org/books/country-activities-report-2019/

26 University of Ottawa, Carleton University, University de Montréal and McGill University.

Participants in a vibrant workshop at ICCCASU3 in Chengdu in China, in July 2019 (Photo Huhua Cao)

ICCCASU has so far staged three conferences:the first, in Ottawa, Canada (2015), attracted 200 attendees;the second (2017), held in Yaoundé in partnership with the Government of Cameroon, saw the participation of 500 people; the third forum (2019) was held in Chengdu, China, in partnership with the China Centre for Urban Development, attended by 150 experts from 23 countries;[27] and, planning is under way for ICCCASU's fourth forum, to be held in Montreal, Canada in 2021.

The long-lasting Canada-China-Africa engagement in urban planning, specifically its focus on good governance, community participation, and adequate, inclusive planning for successful and sustainable urban development, provides opportunities to explore new avenues of mainstreaming South-South and triangular collaboration. By bringing together policymakers, scientists, practitioners in a multi-disciplinary approach to leverage and advance the cause of urbanization in the South, this innovative tripartite partnership offers a viable platform for speeding up the implementation of the New Urban Agenda and SDG11, requiring solidarity, dialogue and sharing best practices among partners.

Contributed by Alain Kanyinda, Senior Coordinator/Policy Advisor, South-South andtriangular cooperation, UN-Habitat, Alain.kanyinda@un.org

(iii) City-led coalitions and regional networks: Cities have taken the initiative to form global networks for tackling climate change and taking action towards reducing their emissions whilst pursuing inclusive and sustainable futures for their citizens. The C40 Cities[28] network was initiated by cities themselves and represents over 650 million people across 90 megacities. It promotes collaboration, knowledge sharing and meaningful action on climate change.It reports that 30% of all climate actions in C40 cities are being delivered through city-to-city collaboration. C40 is funded by Bloomberg Philanthropies, Children's Investment Fund Foundation (CIFF), and Realdania.

United Cities and Local Governments (UCLG)[29] is yet another global forum that represents local and regional governments across all regions of the world, and focuses on local democracy, climate change and environmental protection, the achievement of the SDGs, local finance, urban development and city diplomacy in peacebuilding. The network includes over 240,000 towns, cities, regions and metropolises and over 175 associations of local and regional governments in 140 countries. More recently, UCLG and the UN Capital Development Fund (UNCDF) launched a joint initiative - the International Municipal Investment Fund, in collaboration with the Global Fund for Cities Development, to facilitate access to finance for local urban government investment projects.

27 https://www.icccasu.org
28 https://www.c40.org
29 https://www.uclg.org/en

The **ICLEI – Local Governments for Sustainability**[30] is a global network created by local and regional governments.It comprises over 1,750 local and regional governments across 100 countries, committed to climate change and sustainable urban development. Supporting actions include peer exchange, facilitating strategic connections, capacity and knowledge to inform policy, create systemic change, and promote integrated solutions for local action.

City-based innovation can be a powerful way for cities to play a leadership role in tackling local challenges, but also to support other cities in taking innovative action.For instance, the **Durban Adaptation Charter**,[31] hosted by the eThekwini Municipality, promotes city-to-city cooperation and knowledge exchange and is enabling city authorities to bring climate adaptation and mitigation into local development.It has a membership of over 1,000 cities across 45 countries.For instance, eThekwini Municipality and cities in Mozambique organized peer-to-peer exchange visits to share experiences on issues related to climate change adaptation, low carbon solutionsand urban governance.

Furthermore, the **Durban Municipal Institute of Learning** (MILE)[32] is a local government-driven institute that facilitates city-to-city learning and knowledge management through training, study visits and learning exchanges, research, and other learning protocols. MILE recently undertook a study visit to the Kerala Institute of Local Administration (KILA). It has also helped to build a partnership with two local authority associations within Namibia .

Various global, regional and local networks provide effective **forums** for city mayors and local authorities to exchange best practice, raise their voices, and expand partnerships.[33] The **Commonwealth Sustainable Cities Network** (CSCN),[34] established in 2015, is open to city members and local government associations of Commonwealth countries.The network focuses on supporting cities in progress towards the NUA and the SDGs.In Asia, the **Asian Mayors Forum** promotes cooperation among cities, municipalities and local governments throughout Asia towards shared prosperity and improved lives of its citizens.

The **Asia Pacific Cities Mayors Forum** promotes partnerships with business, industry and cities to provide innovative urban solutions to cities.[35] Supported by UNDP, UNESCAP and UN-Habitat, **CityNet** has been bringing together urban stakeholders in the Asia-Pacific Region to build sustainable and resilient cities.[36] Its membership includes over 135 municipalities, NGOs, private companies and research centres.Its activities are focused on capacity-building, city-to-city cooperation and tangible projects, thereby helping cities to respond to climate change, the SDGs and rising infrastructure demands.The **Asian Cities Climate Change Resilience Network** (ACCCRN)[37] supports rapidly urbanizing cities in Bangladesh, India, Indonesia, the Philippines, Thailand and Viet nam in building urban resilience to the impacts of climate change. The intention is intended to influence the flow of funding streams towards this agenda.

More recently, in October 2019, the **Penang Platform to Accelerate Sustainable Urbanisation in Asia-Pacific Cities**[38] was formed at the 7th Asia-Pacific Urban Forum.The Platform is intended

30 https://iclei.org/en/Home.html
31 http://www.durban.gov.za/City_Services/development_planning_management/environmental_planning_climate_protection/Projects/Documents/DAC__Pamphlet.pdf
32 http://www.mile.org.za/Pages/default.aspx
33 http://www.asianmayorsforum.org
34 http://www.clgf.org.uk/what-we-do/cities-network/
35 https://www.apcsummit.org
36 https://citynet-ap.org
37 https://www.acccrn.net/
38 https://www.apuf7.org/initiatives/ppsu

to promote a dynamic alliance of public and private partners to leverage and support cities' strengths in achieving the SDGs and NUA in Asia and the Pacific. Newly emerging is the **Asia-Pacific Mayors Academy,** intended to support newly-appointed mayors through access to expertise, greater awareness of regional resources, networks and peer-to-peer learning and thereby assist in the acceleration of urban sustainability.

(v) Smart city networks:The G20 Global Smart Cities Alliance[39] has recently been formed by the World Economic Forum, in collaboration with the G20 Presidency, to advance global norms for the use of technology in public spaces. Fifteen smart city networks and public and private tech governance groups have joined together to form this new group.This could potentially help local governments and city leaderships to leverage smart digital technology to address the challenges of climate change, energy transition and inclusive economic growth – for instance, to decrease traffic congestion, monitor air pollution, reduce greenhouse gas emissions, and improve resilience toweather-related events.

The **ASEAN Smart Cities Network**[40] provides a collaborative platform for its 10 Member States, all of which face similar challenges posed by rapid urbanization and digitalization.The Network helps its members to work towards the common goal of smart and sustainable urban development, using technology as an enabler. It includes cooperation on the development of action plans for smart cities and catalysing private finance.The **United Smart Cities program**,[41] jointly managed by the Organization for International Relations (OiER) and the United Nations Economic Commission for Europe (UNECE), focuses on key areas of urban mobility, sustainable housing, clean energy, waste management and ICT.Its objectives are to decrease vulnerability of cities to urban migration, demographic changes, environmental degradation and climate change; reduce carbon footprint of cities; enhance the quality of life for inhabitants; improve the environmental quality of the cities; and, establish public-private partnerships (PPPs).

The next section of this report includes just some examples of diverse experiences and good practices drawn from large and medium-sized cities in the Global South, showing how local and subnational governments are dealing with the challenges of climate change and sustainable development. The examples provided here reflect the diversity of approaches that cities are taking to find sustainable solutions by involving stakeholders across disciplines, drawing on evidence to inform policies and to design and implement programmes for the management of the urban space.In particular, the case studies - which attempt to reflect the principles of SSTC – focus on collaborative city-to-city approaches that contribute to lower greenhouse gas emissions and increased climate resilience, as well as achievement of the 2030 Agenda.

39 https://www.weforum.org/press/2019/06/world-economic-forum-to-lead-g20-smart-cities-alliance-on-technology-governance/

40 https://asean.org/asean/asean-smart-cities-network/

41 https://www.unitedsmartcities.org/

III. SELECTED CASE STUDIES IN CITY-TO-CITY PARTNERSHIPS AND SOUTH-SOUTH AND TRIANGULAR COOPERATION ON URBAN PLANNING AND MANAGEMENT, AND ITS IMPACTS ON ADDRESSING CLIMATE CHANGE AND FOSTERING SUSTAINABLE DEVELOPMENT

China, Shenzhen City - Model of green, low-carbon development

Abstract: The city of Shenzhen has won awards for its pioneering work on green low-carbon development – particularly through the introduction of a regional carbon trading scheme, development of green buildings and green spaces, and by advocating for a low-carbon urban lifestyle. This case study also outlines the institutional mechanisms established and emerging results and reflects on Shenzhen's unique, forward-looking approach to promoting SSTC as part of its urban development trajectory and its focus on achieving the SDGs.

Shenzhen, China's modern metropolis (Photo by Yuan Zeng, 2017-12-23)

1. Context

Shenzhen
Population:12.52 million (2017)
Land Area:1997 square kilometres
Shenzhen Municipality established:1979

The vibrant city of Shenzhen, in Guangdong Province, is not only playing a significant role in China's economic reform through its urban transformation but has also taken a leading role in environmental responsibility and in tackling climate change. As part of China's 13th five-year work programme, Shenzhen aims to reduce its CO_2 emissions intensity by 23% (Yue Fue, 2007, No. 15) relative to every RMB 10,000 of GDP (1 RMB = US $0.151 as of 20 August 2016) compared to 2015 levels, and at least 45% (Sina News, 2015) compared to 2005 levels.A specific goal is to ensure that 100% of all new buildings comply with national green building standards.

Having been designated as China's first special economic zone in 1980, Shenzhen pursued industrial growth over the last few decades making it a manufacturing based, carbon-intensive economy. The city achieved phenomenal growth which was accompanied by flexible social and economic policies.Shenzhen's population consequently rose exponentially from 30,000 to over twelve million within a space of 30 years. A large proportion of its citizens are migrants, and the city's demography is represented by a relatively younger, working population.

However, rapid urban development and population pressures have brought several challenges. As Shenzhen has a small land area, the city is projected to run out of land for urban development in 20 years. Energy and water resources are under strain, per capita water availability

is one-fifth of the national average and will not be able to support further demand for resources. In particular, the contradiction between supply and demand of resources and energy has become a key bottleneck to sustainable development. Air pollution also worsened, rising from fewer than 30 haze days per year in 1992 to its highest levels of 187 days in 2004.As its environmental capacity is over-extended, Shenzhen cannot withstand more pollution and would struggle to cope with increased population density.

2. City initiatives

Shenzhen has proposed its own set of ambitious goals for the short, medium and long term in accordance with the goals of UN 2030 Agenda for Sustainable Development. In 2018, the city was enlisted as one of the three pilot areas of sustainable development in China that could potentially become scalable and offer lessons to other cities. Among the efforts to earn Shenzhen this position was the **International Low Carbon City (ILCC) initiative launched in 2012.** Occupying a total area of 53 km² of Shenzhen city, **the ILCC has enabled the city to pioneer and demonstrate sustainable urban planning** and has served as a pilot project demonstrating Shenzhen's transformation from "Shenzhen Speed" towards "Shenzhen Benefits".

Shenzhen adopted a collaborative approach to the design and implementation of the ILCC initiative. The process was led by the Shenzhen Development and Reform Commission and the Shenzhen Eco-environment Bureau in collaboration with other local authorities, including the China Emission Exchange of Shenzhen and the Shenzhen Bus Group Co., Ltd. The process also engaged the private sector in the design and construction of projects.The coordination on legislation, policy guidance and planning of urban spaces was an important feature in establishing and improving the mechanisms for green development.This involved drawing on international and Chinese experts in eco-cities, urban planning, energy, and fostering collaboration across government, private sector firms, NGOs, and research institutions at local, national and international level.The city has also collaborated with other international agencies, including the United Nations Development Programme, the World Bank, Asian Development Bank, Global Environment Facility, World Wildlife Fund, C40 Cities Climate Leadership Group and the R20 Regions of Climate Action.[42] The international cooperation includes studies and activities to establish an international low carbon clean technology innovation platform, track the international low carbon clean technology frontier trends, and focus on the introduction and promotion of technology, project innovation and incubation, as well as trade and finance to update low carbon clean technology innovation concepts.

Over the last decade, Shenzhen has transformed from a polluting, industrial economy towards a low-carbon model of urban development. Several initiatives are under way, and Shenzhen aims to create replicable and scalable experiences for the sustainable development of the world's megacities.The city has made remarkable progress through measures that not only preserve existing buildings but also uses eco-construction for the development of new green buildings and infrastructure. Furthermore, Shenzhen is making energy mix adjustments, promoting the use of renewable energy, and upgrading green transportation and electric vehicles.This approach also promotes and advocates a low-carbon and traditional lifestyle among its residents, supports the preservation of the natural environment and green spaces, and its development practice is rooted in the philosophy of the harmonious coexistence of people and nature.

42 https://www.c40.org/case_studies/urban-efficiency-2-international-low-carbon-city

3. Key achievements

Efforts are paying off, as Shenzhen continues to make outstanding strides in the construction of a green and low-carbon city, as well as a smart and ecological city.Consequently, the city has won the honorary titles of National Garden City in 1994, international "Garden City" in 2000 and " Global 500 Roll of Honour for Environmental Achievement" in 2002. Shenzhen International Low Carbon City has become the flagship project of the China-Europe Sustainable Urbanisation Cooperation initiative and won the Paulson Prize for Sustainabilityfrom the Paulson Institute of the UnitedStates.[43]

In a landmark step, Shenzhen is using carbon trading to promote low-carbon economic, spatial and social transformation in its urban areas.As one of seven pilots set up across the country, the Development and Reform Commission of Shenzhen Municipality and China Emission Exchange of Shenzhen launched Shenzhen's Carbon Emissions Exchange in 2013, the first of its kind in China, with the most active transactions and highest trading volume. Participants include 635 industrial enterprises and some public buildings that account for roughly 40% of the city's carbon emissions. By design, Shenzhen's urban-level "cap-and-trade" carbon emission trading scheme is intended to promote better coordination between economic growth, industrial transition and emissions control. This is also intended to make an important contribution to China's INDCs, as well as to its overall carbon-intensity reduction targets by 2020.

By December 31st, 2017, the cumulative volume of carbon market quotas in Shenzhen was 29.35 million tons, with an accumulated turnover of RMB 904 million (approx. US$127 million). The total volume of China's Certified Emission Reduction (CCER) was 11.05 million tons, with a total turnover of RMB 148 million (approx. US$21 million). The total turnover of the Shenzhen carbon market was 40.4 million tons, and the total turnover was RMB 1,052 billion (approx. US$140 million). Its trading volume and liquidity have been leading the country for a long time.

Shenzhen's carbon market has effectively raised awareness of emission reductions among enterprises and the public. The establishment and operation of this market has enabled more and more Shenzhen enterprises to become aware of the issues of climate change and serious about corporate energy saving and emission reduction. It has also encouraged enterprises to incorporate greenhouse gas emission reduction in their production management and investment decisions.

The urban landscape is transforming through increasing green cover and preserving the natural environment. In 2017, the green coverage rate of the built-up area in Shenzhen was 45.1%, the forest coverage rate was 40.04%, and the urban sewage treatment rate was 96.8%. Shenzhen has built 942 parks with a total area of 22,000 hectares and a per capita green space area of 16.45 square meters. About half of the city's land is classified for ecological protection. Shenzhen now has 2,400 kilometres of greenways and 2,638 hectares of ecological landscape forests.

New green buildings, using low-carbon technologies, are being built. Shenzhen ranks first in the country with its total area of green buildings exceeding 53.2 million square metres. The strict implementation of laws and regulations by city authorities is helping to ensure that 100% of new buildings comply with energy-saving requirements and standards (target 2020). Notably, instead of large-scale demolition, existing buildings are being renovated and preserved whilst adopting energy efficiency and environmental standards.

43 https://www.paulsoninstitute.org/key-initiatives/paulson-prize-for-sustainable-cities/

A green transportation system is helping to reduce emissions. Having made public transportation a priority, Shenzhen put in place measures to enhance coordination between rail transit and conventional city transport for passenger services.By the end of 2017, Shenzhen had 120,000 new energy vehicles, including 16,359 electric buses, over 10,000 electric taxis and over 30,000 electric logistics vehicles. The share of public transport motorization increased to 60%, reaching the level of large cities in Europe and America. By 2020, Shenzhen expects that the participation ratio of motorized travel in public transport will reach 65% and fuel consumption per hundred kilometres will drop by 20%.In 2017, the city has tracked its average concentration of PM2.5 at 28mg/m3, which is deemed to be on a par with levels in other cities in China.

The clean energy mix has significantly increased through measures to promote planning and construction in the city's energy infrastructure. In 2017, the proportion of clean energy was 10.3% higher than in 2010 and the energy consumption structure continues to optimize.Between 2010 and 2017, the proportion of coal has dropped from 12.5% to 7.2%; that of petroleum has dropped from 32.4% to 27.3%; while that of natural gas has increased from 10.2% to 12.8%.

The public is responding positively towards campaigns for a green and low-carbon lifestyle. Shenzhen actively holds low-carbon events such as Land Day, Earth Day, Water Resource Day, Energy Day, Public Transportation Day, Car-free Day, Water-saving Campaign, Plastic Reduction Campaign, and Earth Hour to strengthen the public's low-carbon awareness. Participation in the "Earth Hour" event was high.According to the real-time statistics of the Shenzhen Power Supply Bureau, 33,900 kWh of electricity was saved during one hour of Shenzhen's blackout, equivalent to 13.56 tons of standard coal.

Shenzhen Youth Environmental Protection Festival is one of the brand advocacy initiatives of Shenzhen municipality for environmental protection. It has been held for 14 consecutive sessions since 2005, aiming to improve the environmental literacy of youth and guide them on how and what to do to protect the environment, through interactive games, paintings, exhibitions and talks, so as to achieve the goal with the theme of "Low-carbon Life, Start with Me".

Young volunteers of the Shenzhen Bus Group launched an advocacy week in streets and parks in Shenzhen with the theme of "Optimizing Bus and Travel Green". By distributing communication materials, they introduced to the public the environmental impact of climate change and of using electric taxis, hoping to encourage more and more people to travel green.

Source:Youth volunteerin Shenzhen's Optimizing Bus and Travel Green initiative; Photo credit: Lan Lanhui (2015), Shenzhen Evening News

4. City-to-city partnerships / South-South and triangular cooperation

Since 2012, Shenzhen has undertaken a range of SSC activities with stakeholders from ASEAN countries including Cambodia, Viet nam and Myanmar.[44] A key institutional mechanism has been the leadership provided by the Shenzhen Development and Reform Commission and the Shenzhen Eco-environment Bureau, in promoting the city's efforts on City-to-City partnerships and South-South cooperation on climate change.

The core SSC activities spearheaded by these organizations include facilitating participation in exhibitions, promoting discussions and exchanges, fostering strategic research, knowledge sharing and capacity-building, and technical assistance on eco-environmental protection. Additionally, by building platforms for cooperation and exchange, Shenzhen is supporting the promotion and application of low-carbon clean technology where great efforts have been made and good results have been achieved.

Over 100 participants from developing countries have benefited from training. Climate negotiators, officials, technicians and NGO representatives from Asia, Africa, Latin America, the Caribbean, Oceania and Eastern Europe, attended two South-South cooperation training courses in 2016.These were hosted by the National Development and Reform Commission and the Ministry of Commerce. Participants also visited the most representative low-carbon enterprises in Shenzhen, such as the BYD Company and Gagaway Lighting Company, to exchange technologies and share knowledge.

Since 2015, the annual **Shenzhen International Low Carbon City (ILCC) Forum** has been hosted by the Shenzhen Municipal Government in conjunction with the Shenzhen Climate Change Centre and the Harbin University of Technology (Shenzhen), along with other scientific research institutes. This event includes the South-South Policy and Action Seminar on Climate Change, which has helped Shenzhen to establish an internationally influential exchange platform. It brings together experts and business representatives to share technology and knowledge, discuss how best to deepen pragmatic South-South cooperation on climate change and help countries achieve win-win solutions for shared sustainable development. These forums and symposiums provide an internationally influential communication platform, which help to promote low carbon technology, such as new energy vehicles and renewable energy, and facilitate mutual learning and knowledge exchange on advanced green low-carbon technology.

In the ILCC events (2016 and 2017), participants from different developing countries shared their country's actions on climate change and their experiences and gains from participating in the training courses. All participants reflected that they had learned a lot about South-South cooperation on climate change through the training.Consequently, participants hoped to use this platform to further their cooperation with China.

In particular, participants engaged in wide-ranging discussions to promote energy-saving equipment and facilities through the platform of South-South cooperation and to introduce new electronic and electrical technologies (Ghana); acknowledged that climate change and environmental pollution had brought many problems to African countries and looked to further exchanges on climate change information data collection centres in different regions (Nigeria); looked to South-South Cooperation for further support in the attainment of sustainable development through transfer

44 Shenzhen Special Zone Daily, 8 September 2017. Accessible at http://www.tanjiaoyi.com/article-22423-1.html. Last retrieved on 18 November 2019

of technologies, experience, and knowledge on urban transport integration, urban planning and waste management (Bangladesh).

The Shenzhen Municipal Government has held forums to facilitate in-depth discussions and exchanges with Chinese experts, scholars, researchers and officials from relevant fields in developing countries. More recently, in 2019, the Shenzhen Eco-environment Bureau hosted the China-ASEAN Seminar on Policies and Action to Address Climate Change and a meeting to exchange information on port docking technology . The participants included representatives of ASEAN Biodiversity Centre officials, and representatives of environmental protection ministries of ASEAN countries, including Cambodia, Viet nam and Myanmar. The aim of this activity was to build a green "belt and road", carry out in-depth South-South cooperation on climate change, rally the consensus of all ASEAN parties in the field of climate change, enhance the capacity of ASEAN countries to cope with climate change, and promote a "Going International" vision of Chinese environmental protection technologies and industries.

The Shenzhen Foundation for International Exchange and Cooperation (SFIEC) was established in 2014, with initial government funding. Aimed at boosting Shenzhen's competitiveness and at deepening its international outreach, the foundation promotes exchange and international cooperation between Shenzhen and other partner cities.Activities include academic research, conferences, trainings, sports and cultural events.The foundation is managed by a council represented by government officials, professionals and entrepreneurs under the guidance of the city foreign affairs office.

This year, the Shenzhen Municipal Commission of Science, Technology and Innovation has established mechanisms to promote international science and technology cooperation and exchanges between Shenzhen-based entities and other partners overseas. This includes joint international cooperation projects in key priority sectors including green and low carbon technologies. Shenzhen is also looking at measures to strengthen cooperation standards and laboratory construction in renewable energy, energy conservation and emission reduction, promoting scientific and technological enterprises to actively develop markets and be more outward facing.

5. Conclusion

Shenzhen remains at the vanguard of Chinese economic reform and low-carbon efforts. The city has successfully pursued a green approach to development of its urban space and economy through resource saving and environmental protection, the optimisation and upgrading of industrial structures, and strong advocacy for green and low-carbon production and urban lifestyles.

The SSC approach to tackling climate change is aligned with the priorities of China's national climate strategy and national targets. Simultaneously, Shenzhen is also using its experience to participate in low carbon development international cooperation through engaging with other countries on capacity-building, knowledge and technology sharing, and facilitating policy discussions. Shenzhen also sees the potential value of the SSC platform in promoting its participation in the construction of China's "Belt and Road" Initiative (Zengkun, 2019).

As Shenzhen continues on its urban development journey, it is seeking to broaden the scope of its cooperation and mode of partnerships with other developing countries to promote the sharing of advanced low-carbon technologies and urban development models.

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India: Building urban water resilience – A tale of three cities

Abstract: Indian cities are prone to several shocks and stresses, usually aggravated by varying climatic conditions. The most widespread of these include water scarcity, pluvial and fluvial flooding, vector and waterborne disease, heatwaves and air pollution.While the challenges are many, this case study highlights the experience of three Indian cities – Chennai, Pune and Surat – in tackling urban water management. All three cities are part of the 100 Smart Cities Network - an initiative of the Ministry of Housing and Urban Affairs (MoHUA), Government of India, and are also part of the 100 Resilience Cities, a global network facilitated by the Rockefeller Foundation. In addition, the cities are also part of several other global initiatives supported by bilateral and multilateral agencies. South-South cooperation has helped these cities to engage with networks and enabled city champions and urban managers to gain exposure to new knowledge and ideas, and to learn from initiatives implemented by other cities in the Global South. In some cases, these networks have also enabled the cities to secure the necessary support, both in terms of technology and additional funding, to mainstream their water resilience strategies.

1. Context

The scale and pace of urbanization in India is unprecedented. Cities as engines of growth are estimated to support more than 40% of the country's population by 2030 (CREDAI, 2019). However, climate change and natural disasters affect physical infrastructure and result in loss of lives and economic losses. The 2006 floods in Surat affected over two million people with an estimated loss of US $2 billion (Parth, 2019); and, the Chennai floods in 2015 resulted in the loss of more than 280 lives and US $1.5 billion in damage to infrastructure (Saldhana, 2016). While these cities are intermittently affected by floods in the course of a decade, they are also affected by annual urban droughts during the summer months, leading to water scarcity and outbreaks of waterborne diseases.

India is taking several initiatives to build urban resilience to safeguard the interests of its citizens and urban infrastructure.National programmes like Smart Cities and the Atal Mission on Rejuvenation and Urban Transformation (AMRUT) focus on improving city infrastructure and service delivery to ensure that cities develop in a sustainable manner, creating a liveable environment for their citizens. The National Disaster Management Authority (NDMA) has prepared guidelines for managing urban floods; the Town and Country Planning Organization (TCPO) has prepared a Standard Operating Procedure (SOP) to help cities manage floods; and, the Indian Meteorological Organization has developed mechanisms for providing improved cyclone and city level flood warnings. Some cities have developed detailed city disaster management plans and early warning systems.

A need is felt for coordinated action to build city resilience to disasters in general and urban floods specifically. In collaboration with the 100 Resilience Cities (100 RC) Program of the Rockefeller Foundation, the Urban Resilience Unit (URU) was established within the National Institute of Urban Affairs (NIUA) to promote and support the development of resilient practices within cities across India. The URU is developing stakeholder partnerships through a national platform and is helping to build evidence and policy frameworks that can be used to build local capacity and mainstream resilience in the urban discourse. This includes developing tools, concepts, data frameworks and protocols, curriculums and training programmes for urban planning institutes and universities, urban practitioners, city managers and policymakers, to enable evidence-based, informed decision-making for resilience building in cities.

This case study focuses on the experiences of three Indian cities in urban water management, namely: (i) Chennai's inclusive water resilience strategy in the context of water scarcity and floods;(ii) Pune's river rejuvenation strategy which includes nature-based solutions; and, (iii) Surat's Tapi river management strategy, through the establishment of end-to-end early warning systems, river water quality monitoring and resettlement of vulnerable populations.

2. City initiatives

CITY 1: **Chennai City, India's fourth largest metropolitan area, is an important urban centre, a major port, and remains a strong economic engine as the capital of the state of Tamil Nadu.** The city faces challenges such as unplanned growth, lack of affordable housing, environmental degradation, encroachment on water bodies, waste mismanagement and a high exposure to disasters such as flooding, drought, cyclone and heatwaves (Resilient Chennai, 2019).

Chennai

Population (2011): 4,646,732 (GOI, 2011)

City Area: 176 square kilometres (CMDA, 2019)

Chennai Municipal Corporation, established 1688

Chennai has experienced several climate-related events. For instance, severe flooding in December 2015, caused by extreme rainfall, resulted in losses and damage estimated at $1.5 billion (Saldhana, 2016). Experts agree that the impact of the flooding was increased because the city's storm water drains and other waterways were clogged with waste, resulting in large-scale inundation. Furthermore, *ad-hoc* dumping sites contributed to movement of garbage during the flood, posing a health and environmental risk to residents (Resilient Chennai, 2019).Almost 30% of thepopulation live on the banks of its water bodies, which puts them at high risk of flooding. As Chennai depends on rainfall for its water supply, the city experiences water stress in low rainfall years.In 2019, the city faced serious drought condition resulting in the closing of schools, rationing of the water supply and office closures.

In 2014, Chennai was selected as a member city of the 100 Resilient Cities programme which led to the launch of its Resilience Strategy, *"Kaleidoscope: My city through my eyes" (2019).* The Resilience Strategy for Chennai focused on priority issues of: healthy and planned urbanization (Urbanizing responsibly); Water systems (Carving a resilient future around water resources); Disaster preparedness (Making Chennai a prepared city); Ecosystem governance (Together, we lift Chennai); Vulnerable communities (Valuing the city's vulnerable). Currently, Chennai is cleaning, conserving and restoring more than 300 water bodies to ensure ground water recharge and water retention. The city is also engaged with the Nature Conservancy to clean up and restore its wetlands to facilitate ground water recharge.The city's urban horticulture project is also part of the resilience strategy, and is expected to deliver a number of benefits including: growing food locally to strengthen food security and improve the urban poor's access to nutritious food; segregation of waste at home and composting to improve the urban environment and reduce health hazards; awareness about water consumption through measures such as drip irrigation and rainwater harvesting which add to the city's water security during times of drought; and the city is also exploring opportunities to maximize this as a water retention strategy.

Chennai, View of the Mylapore Temple Tank System (Photo: Cynthia van Elk, from Water as Leverage)

Chennai:Key achievements

Chennai is pursuing initiatives to build resilience against local shocks and stresses. Some small-scale projects, centred around lake restoration and conservation, are being taken up by city government and other multilateral organizations. The city is also working on restoring 330 lakes and wetlands across the city, as more than 85% of its water bodies are currently degraded. Two thirds of these restoration works are being conducted by the City Corporation and one third by the private sector through corporate social responsibility. The urban horticulture project, in partnership with the Greater Chennai Corporation (GCC) Education Department, Resident Welfare Associations (RWAs) and corporation schools in the city, aims to cultivate ownership and meaningful engagement with citizens to raise awareness about the value of waste segregation and water conservation, as well as provide citizens with access to locally grown food by developing rooftop gardens.

Chennai: City-to-city partnerships / South-South and triangular cooperation

Chennai is part of the 'Water as Leverage' programme. This Dutch Government initiative involves three cities: Chennai, Khulna (Bangladesh) and Semarang (Indonesia) to help them address their urban water and climate-related challenges. As a part of this programme, the three cities are focusing on projects to mitigate flooding and drought through green infrastructure projects, management of storm water drainage and reducing runoff by retaining excess water during extreme rainfall events. The project team members in the three cities meet regularly to discuss their progress, design, and financing solutions, which not only supports lesson learning, but also helps them to motivate and inspire each other. These meetings often include multilateral and international donor agencies to help brainstorm around creative financing options for implementing these projects.

As a member of the 100 Resilient Cities (100RC) network, Chennai is part of a global network of cities, experts and solution providers. Through this, the city's Chief Resilience Officer

(CRO) and government officials have had the opportunity to learn from, engage with and interact with other cities across the world through conferences, workshops, city visits, curated network sessions and design thinking exercises to enable knowledge sharing and peer-to-peer learning.

Chennai's interactions with other cities have inspired them to adopt different initiatives to address their challenges. For instance, Chennai's CRO, an expert from the Madras Institute of Development Studies and a senior planner from the Tamil Nadu Government Slum Clearance Board, attended a 100 RC-facilitated thematic workshop on Informal Housing in Addis Ababa (Ethiopia). Other cities, including Accra, Addis Ababa, Cape Town, Lagos, Montevideo, Paynesville and Salvador also participated.

The lessons from Addis Ababa and Cape Town inspired Chennai to develop a detailed project review (DPR) for disaster resilient low-income housing comprising both *in-situ* redevelopment and proximity slum resettlement options. The presence of the senior planners from the Tamil Nadu Slum Clearance Board was imperative in moving this process forward.

Similarly, workshops involving the three 'Water as Leverage' cities highlighted the value of green and nature-based solutions for managing water within cities. Through this involvement, Chennai city and Tamil Nadu state officials met with the water ambassador for the Netherlands and the other Asian cities and gained an understanding of the value of managing and conserving water fortimes of drought.During a recent workshop, Semarang secured possible funding for some of their projects. This is currently acting as an inspiration to Chennai stakeholders to continue in pursuit of funding for their water projects conceptualized through 'Water as Leverage'.

CITY 2: **Pune is the second largest city in the state of Maharashtra, India**. Situated in one of the world's largest bio-diverse hotspots, the Western Ghats, Pune has grown around the confluence of two rivers, Mula and Mutha.

Pune
Population: 3,124,458 (GOI, 2011)
Land Area: 276 sq. km (GOI, 2011)
Pune Municipal Corporation, established: 1950

However, the rapid urbanization in Pune has not been adequately supported by planned infrastructure provision and service expansion.Climate change means that Pune is experiencing extreme rainfall, resulting in flooding and outbreaks of disease, and increasing temperatures resulting in urban heat islands. Stakeholders have identified issues such as flooding, extreme rainfall and disease as their acute shocks, and the challenges of mobility, affordable housing, air and water pollution, and solid waste management as their chronic stresses.

Pune: City initiatives

To address the identified shocks and stresses, Pune has developed a resilience strategy. This includes 10 goals and 28 actions with over 40 projects that focus on three key pillars: (i) Guiding integrated and equitable growth; (ii) Mainstreaming climate action, environmental planning and natural resource management; and, (iii) Strengthening the diverse economy and workforce.

One of the projects in Pune resilience strategy is to embed eco-sensitive solutions within the Mula-Mutha River Conservation and Riverfront Project initiated by the Pune Municipal Corporation (PMC). This single project has the potential to address both the heat island effect and flooding in the city, besides improving the quality of water in the river. Initiated by the PMC, the INR 2,600 *crore* river development project aims to improve the quality of river water, mitigate

flooding, provide access to the river through a continuous public space along the river's edge, as well as integrating various heritage structures and activities (Resilient Pune, 2019).

An additional project on cleaning up the rivers is in progress under the National River Conservation Plan. This is a joint initiative of the PMC and the National Government, with financial support from the Japan International Cooperation Agency (JICA). At present, the sewage treatment plants are working with limited efficiency and only 71% of the total waste generated is treated (PMC, 2017). The remaining 29% is released into the river untreated (ibid). This project includes the construction of 11 new sewage treatment plants, laying of 113.6 km of new sewer lines, renovating 4 pumping stations, enabling the city to cater to its sewage treatment requirements up to 2027 (MoEFCC, 2019).

Pune has also undertaken other collaborative projects. With the intention of bringing a larger vision to the river development project to build the overall resilience of the city and maximize the value of the river, Pune partnered with the Resilience Accelerator programme, that is a joint initiative of the 100RC and the Centre for Resilient Cities and Landscapes at Columbia University, in the United States. The aim of this collaboration was to expand the resilience value of the river development project through research and nature-based designs, to bring together the accumulated advice from local and international experts, and to create an engaging platform that can bring multisectoral decision makers to advance the project design and implementation, as the river edges are in the jurisdiction of various institutions - PMC, Pimpri Chinchwad Municipal Corporation and the Defence area.

The design was developed in a participatory manner. In January 2019, Students of urban design from the Bharati Vidyapeeth Institute of Environment Education and Research and the Pune College of Engineering along with the students of Columbia University, helped to develop 10 urban design principles for the river's restoration. This alternative vision for a long-term socio-ecological revitalization plan, included concepts for revegetating the river edges, integrating the natural bird habitat and basalt outcrops along the river, and creating ways of connecting the people with their ecological assets. This vision was developed in consultation with various community and environmental groups and was tested by the students at various locations on the river. The recommendations are currently being evaluated by the city.

Pune:Key achievements

Pune's efforts have been widely recognized. The city was ranked first in the Ease of Living Index calculated across 111 cities in India by the MoHUA in 2018. The PMC is viewed as a high performing local body in the country and has made remarkable progress in enhancing service delivery to its citizens. Pune was also ranked first in urban governance across 23 Indian cities in the 2018 ASICS[45] survey.

45 The Annual Survey of India's City Systems is conducted by the Janaagraha Centre for Citizenship and Democracy, an NGO based in India

Pune, Bridges are improving urban mobility and connectivity
(Photo: Mangesh Dighe, Environmental Officer, Pune Municipal Corporation)

City-led initiatives are beginning to lead to significant transformations. The restructuring of theMula-Mutha River Conservation and Riverfront project, aimed at maximizing its value and building overall resilience of the city, has brought significant transformation in urban areas.Pune is also seeking to reduce the use of concrete by adopting nature-based solutions for restoring the river and lake ecosystems. This is the first of its kind in India and is expected to inspire other cities to view its water systems differently. In addition, developing the plan with an emphasis on implementation mechanisms will further support effective and systematic implementation of the project.

Pune: City- to-city partnerships / South-South and triangular cooperation

Pune became a part of the 100 Resilience Cities cohort in 2016, and since then the city team has interacted with other cities through strategic networking events, exposure visits and technical workshops facilitated by 100RC. Interactions with Singapore, Accra, Jakarta, Bangkok and Medellin have been prominent in terms of peer-to-peer learning.

Of these interactions, two, Singapore – Pune, and Pune – Accra, have proved to be significant in terms of influencing the strategic thought process of the city. On the one hand, Pune gained a deeper understanding of river management from Singapore and on the other, Pune inspired Accra to address its solid waste management challenges from a bottom-up and decentralized approach. Pune's Chief Resilience Officer (CRO) along with the PMC Environment Officer and Assistant Municipal Commissioner, attended an implementation training session organized by 100RC in Singapore in 2016. This event brought about a dramatic change in how the city of Pune viewed its riverfront development project.

The exposure visits in Singapore and experience sharing on river management and ways of addressing challenges through eco-sensitive planning and design resulted in restructuring of the Mula-Mutha River Conservation and Riverfront project. A previous version of this project had come under criticism from local communities for overlooking the native rock forms and wildlife habitats, with concepts of concreting the river banks.However, the revised project now aims at embedding resilience values by enhancing ecosystem benefits, risk proofing against disaster and climate change, and conserving and restoring the river and lake ecosystem.

During the same event, the city of Accra was enthused with Pune's work in the bottom-up solid waste management model. Pune's Municipal Corporation has estimated that the model of front-end waste management service has saved approx. US $2 million annually in waste handling (PMC, 2019b). The model involves door-to-door waste collection by a local cooperative for a user fee. The waste collectors also contribute to reducing carbon and other greenhouse gas emissions, as recycling reduces the quantity of waste sent to landfills. Learning about this successful model has motivated Accra to address its solid waste management challenges from a different perspective.

CITY 3: Surat City, **in the state of Gujarat, is one of the fastest growing cities in the country**. Located along the banks of River Tapi, Surat is exposed to sea level rise, tidal flooding, flash floods, extreme heat and consequent health risks (Resilient Surat, 2017).

Surat
City Population (2011): 4,466,826 (GOI, 2011)
City Area: 326.5 square kilometres (SMC, 2019)
Surat Municipal Corporation, established: 1852

The river Tapi is the main source of water supply, and droughts and the late onset of the monsoon are creating stress on Surat's water supply system during peak summers. In the past 100 years, Surat has experienced 24 floods, including significant ones in 2006 and 2013, and an outbreak of plague in 1994. In 2006, the sudden release of flood waters from the Ukai Dam on the River Tapi, upstream of Surat, resulted in inundation of 80% of the city for four days, affecting two million people with estimated losses of about US $2bn. Ex-post assessments attributed this event to a number of factors, including faulty watershed management and urban development practices (CSE, 2015).

Surat: City initiatives

In 2008, Surat joined the Asian Cities Climate Change Resilience Network supported by the Rockefeller Foundation. This led to the setting up of the Surat Climate Change Trust (SCCT), Urban Health and Climate Resilience Centre (UHCRC), and End-to-End Early Warning and Health Surveillance Systems (NIUA, 2014).

Surat was selected as a member city of the 100RC Network in 2013. The city appointed a Chief Resilience Officer (CRO) and released its City Resilience Strategy in 2017. The Strategy identifies 20 goals with over 60 initiatives, seeking to "foster robust and thriving communities that are healthy, just, economically viable, and environmentally sound".

Water is one of the key themes at the core of Surat's City Resilience Strategy.This focuses on water availability and quality, employment and economic dependency, ecosystem and environmental regulation, and improving health. Altogether, 30 out of the 63 proposed initiatives focus on water management – ranging from water quality and supply to flood resilience, rejuvenation of water bodies and community spaces - through an integrated approach, addressing green, blue and grey infrastructure systems for managing urban water.

The River Tapi Rejuvenation Project has been taken up as a priority.This includes river cleaning, which is being implemented with funding from the state and the Smart Cities Mission; andriverfront development, which is being developed on similar lines as in Mexico, Da Nang, Rio de Janeiro cities. An interesting feature of this component is the 'water plazas' which are being developed by all these cities, including Surat, with support from Rotterdam. The 'water plazas' aim to increase the permeability of urban spaces, reduce runoff, and facilitate groundwater recharge which will support water resource conservation and also accrue benefits of flood resilience and related public health issues. The project also includes periodic monitoring of tidal creeks which have been demarcated as eco-sensitive zones and will be monitored for regulating effluent discharge from industries. It is estimated that once completed, the project will be able to supply more than 45% of the city's water needs.

Surat, Tapi River during the summer (Photo:Corjan Gebraad, March 2019)

Surat: Key achievements

The creation of institutions (for instance, SCCT and UHCRC) and an institutionalized position of Chief Resilience Officer within the city government has helped in mainstreaming the resilience agenda in the city. An excellent example of this transformation is the River Tapi Project, which brings together multiple stakeholders, including state and city-level departments, for implementation of a shared common agenda of flood resilience that aligns with the development vision of the city.

The process has had a multiplier effect – both in terms of getting more funding and support for scaling up action within the city and replicating similar initiatives in other cities in the region. Multiple initiatives proposed in the Strategy, including the River Tapi Project, have been able to secure funding/co-funding from national level schemes for instance, the Smart Cities Mission. Surat City is also playing a key role in driving the Regional Covenant of Mayors for Climate and Energy in the state of Gujarat, India. The network includes eight member cities and is facilitated by the International Urban Cooperation (IUC) programme of the European Union which works closely withthe Global Covenant of Mayors (GCoM) in supporting city-level voluntary action to combat climate change. With its decade-long experience of working on climate change action and resilience building, Surat City is sharing key lessons learned with fellow member cities through a series of meetings and workshops in this ongoing initiative.The city is now getting support from the IUC

and the Dutch Government to implement the proposed 'water plazas'. The Regional Covenant of Mayors, with support from the IUC, is helping to replicate the process in other cities in the state of Gujarat through exchange with European cities.

Surat: City-to-city partnerships / South-South and triangular cooperation

Surat is an active participant in several South-South cooperation networks.In 2008, Surat was one of 10 cities, including others from Viet nam, Indonesia, Thailand and India, to participate in the Rockefeller Foundation-funded initiative, Asian Cities Climate Change Resilience Network (ACCCRN), which focused on shared learning across cities. The engagement resulted in setting up the Surat Climate Change Trust (SCCT), Urban Health and Climate Resilience Centre (UHCRC), and End-to-End Early Warning and Health Surveillance Systems (NIUA, 2014).

Surat participated in 5 ACCRN knowledge forums on: (i) knowledge exchange; (ii) mainstreaming climate change adaptation; (iii) governance; (iv) impact of project implementation on urban climate change resilience; and (v) sustaining city action (Kernaghan and Da Silva, 2014). In addition, Surat worked closely and had city exchanges with Semarang, Indonesia and Da Nang, Viet nam, both of which face similar issues of flooding and vulnerable communities in low-lying flood-prone areas. Surat and Da Nang also shared experiences on and implemented similar relocation and rehabilitation plans for flood-prone urban poor communities.

As one of the first cohort of cities in the 100RC network globally, Surat participated in multiple global and regional (APAC) exchanges.The city was able to learn from and share its experience with fellow member cities, including Mexico City, Medellin, Rio de Janeiro, Da Nang, Semarang and Bangkok in the Global South. One such key network collaboration was the Water Exchange organized by Rotterdam City and 100RC in October 2015, which focused on the complex intersection of climate change, aging infrastructure, flood management, urban development, and social connectivity, combined with the diverse perspectives brought by participating CROs from nine cities. These cities included Bangkok and Mexico City, with which Surat worked closely over the next couple of years. This also resulted in a city exchange with Mexico City in November 2015, wherein the two cities collaborated on shared learning for resilience through 'living laboratories' (Resilient Surat, 2017).

Another key engagement was the Singapore Regional Summit organized by 100RC.Its aim was to strengthen relationships among CROs, resilience team members, and partners working in the APAC region to better leverage the network of practitioners. It fostered a regional cohort by bringing to the fore regional priorities - including mobility, social cohesion, and housing - to help advance collective action. The engagement helped in building Surat City Resilience Team's capacity to work around problem definitions and city actions (Resilient Surat, 2017).

The network collaborations, facilitated by 100RC, have enabled Surat to continue engagement with other cities.These include: Bangkok, Mexico City and Semarang which helped the city of Surat in conceptualizing multiple initiatives for addressing its flooding, water quality and public health issues – such as for flood management, water quality monitoring, river rejuvenation, and conservation of biodiversity.

Conclusion

The Indian cities of Chennai, Pune and Surat have all benefited from and informed the work of other cities through South-South cooperation. Surat has engaged with other global cities – mainly through their participation in forums such as the 100 Resilient Cities and the ACCCRN. In turn, these cities have also been able to inform the work of other cities through knowledge exchange and sharing of experience. Experience has shown that there is considerablesimilarity between cities across the Global South, with opportunities for cross learning to develop ideas, innovate and bypass some of the developmental challenges. Over time, these three Indian cities have demonstrated that it is possible for a city to turn challenges into opportunities.

The city of Chennai has benefited from its interactions with cities across the Global South and is engaged in a process of urban transformation. Interactions with cities like Addis Ababa and Cape Town have helped it to rethink its resettlement strategy, especially for communities vulnerable to flooding in exposed areas. This has been evident in their resilience strategy, with a strong focus on disaster preparedness and vulnerable communities. Chennai has also used its experience and lessons from Semarang and Khulna to think creatively about green solutions to flooding and drought, then motivate their city leaders to drive this agenda and engage with citizens. These interactions have also helped the city in pioneering efforts such as urban horticulture, tackling challenges such as heat stress, drought and access of vulnerable communities to food.

Pune's Resilience Strategy has adopted a participatory, citizen-centric approach with a focus on water. The Strategy is a collective voice of citizen groups, civil society, NGOs, industries and the local government which identifies the Mula-Mutha River Conservation and Riverfront Development as a key focus for building resilience. The rivers, rising in the Western Ghats, are of crucial importance, as the Western Ghats, older than the Himalayas, are a UNESCO World heritage site with immense biodiversity value. Learning how to integrate this heritage biodiversity in the river's rejuvenation has been a significant learning process for Pune, through its engagement with the city of Singapore. Moreover, the Resilience Accelerator initiative has suggested ways to coalesce the concerns of various local community and environmental groups into design and planning solutions which support Pune in building a resilient city. As the city Commissioner rightly observed, "Pune has the potential to become a lighthouse city in resilience building in India and can encourage other cities to follow it" (Resilient Pune, 2019).

In recognition of its pioneering efforts in water management, urban mobility and urban governance, Surat has received multiple national level awards including the India Smart Cities Award 2018. The challenges of climate variability and climate change are quite different among Indian cities, given their geo-climatic diversity, institutional mechanisms, and availability of natural, socioeconomic and environmental resources. Through initiatives and actions that strengthen the city as a whole, Surat's Resilience Strategy has enabled it to address its past challenges while at the same time recognizing the increasing unpredictability of the future. The resilience-building process has not only helped the city in addressing its issues, but also in building various national and international partnerships to come up with innovative solutions for a vibrant and thriving city.

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The National Institute of Urban Affairs (NIUA) is a premier institute for research, capacity-building and dissemination of knowledge for the urban sector and is an autonomous body under the Ministry of Housing and Urban Affairs, Government of India. NIUA conducts research and supports innovations in the urban sector through informed dialogues, knowledge exchanges, training and capacity-building. The Urban Resilience Unit (URU) at NIUA, established with the support of 100 Resilient Cities, is aimed at supporting national, state and city-level institutions and other stakeholders to link resilience to their urban planning, development and management discourse.

100 Resilient Cities (100RC), pioneered by the Rockefeller Foundation, is dedicated to helping cities around the world become more resilient to the physical, social and economic challenges that are a growing part of the 21st century. 100RC supports the adoption and incorporation of a view of resilience that includes not just shocks, but also the stresses that could threaten and weaken the fabric of the city on a day-to-day or cyclical basis.

Argentina, Buenos Aires: Tackling heatwaves and urban heat islands

Abstract: The City of Buenos Aires has committed to be a carbon neutral, resilient and inclusive city by 2050.Several measures are under way to tackle the adverse effects of climate change – most notably, heatwaves and urban heat islands. The Buenos Aires Environmental Protection Agency (APRA) – a city level institution - actively leads these efforts through participatory climate governance, greenhouse gas inventories, public awareness campaigns, and analysis of urban green infrastructure strategies. This case study discussesrelevant aspects of climate change governance by the City of Buenos Aires, adaptation and mitigation measures led by APRA taking into consideration scientific information, and challenges and opportunities. While active dialogue between researchers and government provide the foundation for scientific information and studies in informing future urban green infrastructure, the City's participation in South-South cooperation activities offers a platform for learning and synergies with other southern cities that face similar challenges.

Photo:Buenos Aires Government

1. Context

The City of Buenos Aires (CABA), the capital of the Argentine Republic, is the largest and most populous city in the country. The city is situated within the larger Metropolitan Area of Buenos Aires (AMBA) which also covers 40 surrounding districts and is home to approximately 34 percent of the country's population. Within the larger AMBA, the CABA only has jurisdiction over certain activities within its territory.For instance, many decisions on public transport and electricity generation, transmission and distribution rest with the national government.

City of Buenos Aires (CABA):

City Population: 2.89 million (2010 census)

Wider Metropolitan Area of Buenos Aires: 14.8 million (2010 census)

City Area: 202 km2

City Authority: Environmental Protection Agency (APRA)

Rising temperatures are a major concern for people living in the city. Climate change and growing urbanization are making the city more vulnerable to extreme temperature events – most notably heatwaves and urban heat island effects, where urban settlements experience warmer temperatures compared to the surrounding less built-up and rural areas.

CABA experienced 15 heatwaves between 2004–2013, with at least one heatwave per year (Santágata et al., 2017). The city was gripped by two of its worst heatwaves, lasting 18 days, in November 2008 and December 2013. They coincided with major epidemics of mosquito-borne diseases, such as dengue fever, since mosquitoes thrive in warmer conditions. These heat events drew the attention of governmental agencies, scientists and the media.

Scientific studies undertaken separately by both climatologists and urban planners over the years show the existence of urban heat islands (UHI) in CABA. The urban heat islandeffectmeans that city temperatures are higher by 1.5 to 3.5°C compared to outer suburban and rural areas.However,slight differences in characteristics of UHI emerge from the analysis.

- One analysis (Camilloni and Barrucand, 2012) of the urban heat island in the Buenos Aires Metropolitan Area for the period 1960–2007 found that peak intensities of nocturnal UHI occurred during the summer. This means that temperature differences are most significant during the night and intense increases are felt in the summer season.The study identified that the intensity of nocturnal UHI has been decreasing since 1960, from over 2 °C (1960s) to ~1 °C between 2000-2007.The study has associated this negative trend with a decline in near clear-sky conditions at night, negative trends in the frequency of calm weather conditionsand an increase in wind speed.

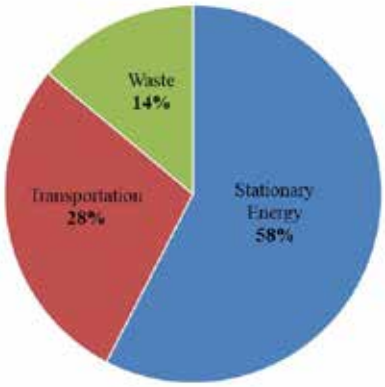
- Another study (De Schiller et al., 2006) assessed the annual and seasonal statistical characteristics of the AMBA´s UHI in relation to the city's urban form, density and architectural design and provided a complementary view.The survey found increases in temperature of up to 3 °C in the evenings, coinciding withareas that had the highest building densities, significant heat losses from heated building interiors, enclosed spaces with lower air flows, and slow-moving traffic. However, when compared to other urban conglomerate areas of the city, the estimated nocturnal mean UHI for the AMBA was less than 1.5 °C .The study thus highlights the importance of building density and compact urban spaces as important variables in urban heat island effects.

Scientists (Rusticucci et al., 2015) are concerned about the relation of these heatwaves to present and future climate warming trends. There is a recognition that heatwaves not only pose threats to public health and well-being but can also affect the useful lifetime of infrastructure. With the heatwaves and rising temperatures, increased demand is not matched by electricity supply, resulting in power outages in the Metropolitan area of Buenos Aires. It represents a challenge not always efficiently met by the responsible authorities, civil protection services and electricity distribution companies.

Scientists have found that these heatwaves are likely to have been caused, in part, by anthropogenic forcing (human activity rather than natural factors) which has increased the risk of recurrence of such events by a factor of five. Urban development, combined with heat from buildings, human metabolism, vehicles and transportation are linked to these trends. These elevated temperatures, particularly in summer months, represent heat-related health risks and air pollution, as well as higher energy demand for air conditioning. Children and older people are at higher risk.

The city has estimated and reported its greenhouse gas emissions and their sources since 2008. Studies show that a significant majority of these emissions arise from activities that are also sources of heat emissions. However, measures to estimate thermal heat emissions,which could usefully help to design adequate adaptation and mitigation measures for heatwaves and urban heat islands, are lacking.An Inventory of Greenhouse Gases (GHG) for 2016 showed emissions of 13.1 million tCO2eq, which primarily came from electricity and natural gas consumption, followed by the transportation and waste sectors. Further investigation showed that the city emission density (64,600 t CO_2eq/km^2) is about three orders of magnitude larger than the country emission density (123.4 tCO_2eq/km^2), indicating the spatially concentrated nature of the city's GHG emission sources.Previously, in 2009, CABA reported the city's first GHG inventories (time series 2000–2008) which, crucially, informed the development of its first strategic Plan of Action on Climate Change to 2030 (PACC). The PACC was updated in 2015 and is presently being revised in line with the goals of the Paris Agreement, proposing targets for reduction of GHG emissions by 2050.

Figure 5. 2016 Buenos Aires Inventory of greenhouse gases.



Source:https://www.buenosaires.gob.ar/sites/gcaba/files/informe_inventario_gei_caba_2015-2016.pdf

2. City initiatives

The CABA has undertaken several measures on climate governance, including legislation and cross-governmental institutional mechanisms.The current system involves the National Meteorological Service providing alerts when a heatwave is forecast. Different areas of government act in response to this (including the Ministry of Health, Civil Defence, among others).

There are three key elements of climate change governance in the CABA as follows:

(i) The **Climate Change Adaptation and Mitigation Act,No. 3871**, which came into effect in 2011 and established the creation of two key bodies: the Inter-ministerial Team and the External Advisory Council. The landmark Act 3871 helped to establish appropriate strategies on climate change adaptation and mitigation, such as the Clean Mobility Plan and the Energy Efficiency Act, among others.

(ii) A body for public participation through the **Forum to Fight Climate Change,** created by **a second Act, No. 5613, in 2016,** which seeks to establish appropriate actions, instruments and strategies for climate change adaptation and mitigation in accordance with the provisions of Act 3871. The Act proposes convening an annual call open to the community to discuss matters relating to the main goals of both Acts. The forum is jointly organized and coordinated by APRA, the External Advisory Council and the CABA Legislature.

Photo credit: Legislatura Porteña. Year: 2017.

(iii) **Membership of several international networks**, as described in the section on South-South cooperation below, which provides opportunities to share experiences with other cities and has led to commitments regarding the reduction of greenhouse gas emissions and the implementation of adaptation strategies.

The Environmental Protection Agency (APRA), a city-level institution under the CABA's Ministry of Environment and Public Space, is the lead enforcement authority. APRA convenes two cross-governmental forums: The **Inter-ministerial Team**, drawn from across government, which helps to articulate the management of public policies associated with climate change; and the **External Advisory Council,** composed of representatives from non-governmental organizations, academics and scientists with recognized expertise in various environmental issues related to climate change. This body functions as an advisory and honorary committee on the preparation of the Climate Change Adaptation and Mitigation Plan andpublic policies and strategies on climate change in general.

Urban heat islands and heatwaves feature strongly in the city's adaptation and mitigation strategy and plans. APRA has also initiated and led several urban green infrastructure projects and campaigns, as described below. The approaches involve planning interconnections between natural and semi-natural green areas that help to address water regulation, prevent flooding, participate in carbon capture and regulate high temperatures during heatwaves, thereby reducing the effects of urban heat islands. As part of its plans to develop an urban green infrastructure strategy, the city is undertaking an "urban green infrastructure against climate change" project that will produce a territorial diagnosis and an analysis of good practices applied in other cities to plan an urban green infrastructure network. The project was initiated in 2018 in conjunction with The Nature Conservancy Foundation (TNC). It will include a series of indicators and a monitoring system for the key ecosystem services provided under the green infrastructure strategy and related to climate change.

3. Key achievements

Demonstration projects, led by APRA, have since helped to strengthen institutional recognition of the importance of the city's urban green infrastructure in coping with the effects of climate change. Plans to scale up these projects are in hand.A few examples are cited below:

A project has shown that street trees create micro-environments with lower temperatures, counteracting the phenomenon of urban heat islands.The "*Influence of street trees as a regulator of high temperatures*" project was launched in 2018 by APRA in collaboration with the civil association Fundación Ciudad.A series of measurements of air temperature, and pavement surfaces were made under tree canopy and in the absence of tree canopy in the Comuna 1 neighbourhood of the city. The study is yet to be published, but the emerging results show large differences in temperature of more than 20°C in surface temperature and 10°C in air temperature in the absence of tree canopy.

An innovative app to calculate the green view index (GVI) has helped to quantify the city's street tree cover. This study contributed to the generation of baseline information on the city's green infrastructure, which will be analysed in depth in relation to distribution, connectivity

APRA's public awareness campaign has enabled citizens to discuss immediate problems in their neighbourhoods and strategies to address these.

- 2,720 people approached in 113 workshops.
- Mass calls made: 258,103
- SMS sent: 2,000,000
- Emails sent: 133,010
- Day centres approached: 26 (100% of city day centres).
- Health Centres approached: 10 (100%).
- Greater participation of female heads of household in the workshops

with green spaces, surface and population density of the city in current projects. The *Treepedia* application, developed by the Senseable City Lab of the Massachusetts Institute of Technology (MIT), captures images of Google Street View (GSV) from a selection of points along the city streets, and estimates the percentage of "obstruction" by the tree canopy with a specially designed algorithm (http://senseable.mit.edu/treepedia). The results are expressed on a scale of 0 to 100 and represented on a map.The GVI for Buenos Aires was 15 points, which represents 15% coverage by street trees in the city, comparable to an average GVI of 20 points in 27 other cities analysed worldwide which have similar population densities to Buenos Aires.

Another survey to map the green infrastructure is informing climate planning actions and may be replicated elsewhere. The survey, undertaken in the informal settlement "Barrio 20", was done in two stages with the collaboration of community leaders. The group is formed from neighbourhood residents trained in environmental issues.Following a preliminary survey carried out with Google Street View of the 30 blocks of the "Barrio 20" settlement, the information was verified and completed in a final urban green infrastructure survey of vegetation. The survey results indicate an absence of vegetated surfaces, with only 555 trees in 30 blocks (or one tree for every 52 inhabitants) which is far from that recommended by the World Health Organization (WHO). The survey results were discussed with the government agency in charge of the urbanization of Barrio 20.APRA plans to replicate this project for other urban settlements in the city, considering its vulnerability to the impact of heatwaves and the need to generate baseline information for planning climate actions.

A massive campaign is raising public awareness and preparedness for climate change. The "*Programme of adaptation to extreme weather events*", was initiated and led by APRAin 2017. This has raised public awareness about climate change and the importance of being prepared for extreme weather events such as heatwaves. It is aimed at vulnerable populations, primarily the elderly. Additionally, the programme has enabled synergies with other government activities and civil society groups. Citizens' workshops are used to present concepts on climate change and its effects, as well as different types of weather alerts for heatwaves, symptoms of "heatstroke" and recommendations on how to act in such events. These are accompanied by annual mass communication campaigns to spread the message and recommendations to the entire population, through interactive voice response (IVR), which include calls, text messages and emails, during the months of summer.

In 2018, APRA received a small grant from the C40 programme "Empowering Cities with Data". The project is developing a platform to manage existing information on urban green infrastructure in order to estimate key ecosystem services for climate change, such as carbon sequestration and thermal regulation.The initiative arises from the need to assess the potential of green infrastructure for the city, and to be able to develop comprehensive policies and strategies for adaptation to and mitigation of climate change. In the framework of the development of the platform, a Green Infrastructure Work Table, drawn from different areas of government involved with green infrastructure was convened. This allowed discussion about the potentialities of the platform, information generated, sources, and methodologies.

4. City-to-city partnerships / South-South and triangular cooperation

CABA's approach to South-South cooperation extends to its participation in a number of international city network groups to exchange technical knowledge and best practice, adherence to recognized standards, and access to funding.

The main approaches and results of CABA's partnerships are as follows:

The city is part of the C40 Cities Climate Leadership Group. Currently, the CABA participates in several C40 working groups. Regarding climate change adaptation, some of them are devoted to assisting cities to address the impacts of floods in the urban space, to design and implement solutions to adapt to extreme heat events and to assess climate risks. The CABA also participates in working groups on climate action planning, reporting of climate data and measurement of greenhouse gas emissions. Within the framework of Buenos Aires Carbon Neutral 2050, C40 provided technical assistance through a City Adviser, to elaborate the new Climate Action Plan, as well as a small grant from the C40 "Empowering Cities with Data" programme.

The city has participated actively in the Global Covenant of Mayors (previously known as the Global Compact of Mayors).In 2015, during the C40 Latin American Forum in Buenos Aires, the City's government signed up to the " Covenant of Mayors", the world's largest coalition of city leaders addressing climate change. Various commitments were made, including adapting their greenhouse gas inventories (2000-2014) to the basic level of the Global Protocol for Community-Scale Greenhouse Gas Emission Inventories. This Protocol is the first comprehensive global methodology used by cities around the world to estimate their greenhouse gas emissions, because it offers a clear and robust framework based on existing and internationally recognized methodologies. The City's inventory 2000–2014 was updated using the Global Protocol for Community Scale Inventories (GPC) methodology, to comply with the obligations assumed in the "Covenant of Mayors".

The city is also a member of the network of Local Governments for Sustainability - ICLEI, founded with the support of the United Nations Environment Programme (UNEP), and United Cities and Local Governments (UCLG). In December 2018, Buenos Aires joined ICLEI's Global EcoLogistics initiative, with the Ministry of Urban Development and Transport, aimed at improving transport management and reducing emissions in the logistics sector.

The city also works with the Carbon Disclosure Project (CDP) for self-reporting of environmental data. CDP is an organization responsible for a system of global collection and dissemination of self-reported environmental data to companies and policymakers to support decision-making, risk management or opportunity identification. Every April since 2011, the CABA has reported the city's greenhouse gas inventory, all climate actions and sustainability measures carried out at governmental level.In 2018, the CDP developed a new scoring methodology for cities, based on the CDP's principles for a sustainable economy, with the aim of helping to provide cities with a roadmap to mitigate and adapt to climate change. According to this scoring methodology, CABA has been placed into the scoring band of "leadership". This demonstrates best practice standards for adaptation and mitigation reporting, mainly concerning adaptation and climate, and associated risk-related information.Recently, the city organized a meeting with business sector representatives in order to ascertain what actions they are taking and to discuss what others are planning.

5. Conclusion

This case study focused on the City of Buenos Aires' successful approach to tackling issues of urban thermal environment through a strong participatory regulatory framework, as well as through participation in international networks and within a framework of city-to-city partnerships / South-South cooperation. Together, these approaches provide effective tools and integration, both regionally and internationally, to plan climate change strategies and benefit from a fluid dialogue between stakeholders which has helped to bridge the disciplines of management and science.

Buenos Aires has made significant strides towards the implementation of adaptation

and mitigation measures on climate change. These efforts include policies and institutional frameworks, a strategic action plan that summarizes the lines of work proposed, as well as its inventory of greenhouse gases. The Inter-ministerial Team, established by Act 3871, provides guidance on collaboration among different areas of government, while the diverse expertise of the members of the External Advisory Council allows discussions from a highly technical and scientific perspective and establishing communication channels with universities. In addition, the leadership of the APRA, and its approach of facilitating the participation of non-governmental organizations promotes transparency in evaluating climate change actions.Furthermore, through the role of the Forum to Fight Climate Change, the city is able to discuss strategies for addressing climate change with its citizens. Although this is a relatively recent example of public participation in the CABA, it has already proved to have great potential.

There is further scope for scientific information to inform policy design.Although the CABA has undertaken physiological, epidemiological and climatological research on hot environments, information on the actual thermal conditions experienced by people in daily life is scarce. Such information could usefully inform the design and implementation of policies and intervention measures related to heat exposure and health. Looking ahead, the city may benefit from further work with the scientific community and academia to prepare an inventory of thermal emissions that provides a clear baseline and quantifies the benefits of ecosystem services provided by urban green infrastructure.

The experiences of Buenos Aires could help to facilitate South-South cooperation. Many cities face challenges similar to those of Buenos Aires and are vulnerable to the combined effects of urban heat islands, climate change and extreme temperature events. As Buenos Aires paves the way for deepening international cooperation with cities across the world, its participation in external networks is not only facilitating the exchange of good practices with other cities, but is also enabling it to establish strategies and goals in relation to its own international commitments.It is worth noting that this cooperation has also promoted a network of scientists and city officials where experiences can be exchanged, and thus considered in decision-making. The approach of addressing gaps raised in a participatory way, with international cooperation in future projects, could potentially generate more synergies and shared learning among cities that are facing the same challenges.

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GIZ: Cities Fit for Climate Change (CFCC)

Abstract: GIZ's global project, "Cities Fit for Climate Change" (CFCC) aims to strengthen cities as actors of sustainable development. CFCC focused on finding answers to the question: How can cities cope with the risks of climate change and become custodians of a liveable climate?Drawing on the experiences from its three partner cities of Santiago (Chile), eThekwini (South Africa) and Chennai (India), this case study outlines CFCC's analytical work on urban climate finance; support to cities in applying new climate-proof urban development approaches; and, use of international Dialogue Forums to facilitate South-South and triangular cooperation between the partner cities.

1. Context

Cities are major contributors to climate change, and also vulnerable to its effects. Driven by urbanization and growth, cities of the future are likely to look different from today.

Cities across the world are actively seeking to take measures to integrate climate change into urban development in order to mitigate climate change and increase their resilience to climate-related shocks. There is a growing realization that existing urban development strategies such as urban development plans, land-use and zoning plans need to become climate-proof so that cities can be resilient and adapt to current and future impacts of climate change. Furthermore, as cities grow, they also need to take climate mitigation considerations into account. This requires a win-win approach of decarbonization while building in measures for climate-proofing of urban development in a manner that responds to the specific needs of each city, improves the quality of life of residents, and doing this in a financially sustainable way.

Cities still face multiple obstacles in obtaining funding for climate-related investments. While large amounts of finance and new instruments are required for modernizing and building infrastructure, domestic revenues are limited.Appropriate legal frameworks and financial management capacities are required to access international donor funds and private capital markets are often missing.

Every city is unique and there is no single solution to resilient low-carbon urban development. GIZ's Cities Fit for Climate Change (CFCC) project was aimed at developing integrated instruments that enable a new type of climate-proof urban development.The CFCC project partnered with three cities,Santiago (Chile); Chennai (India); and eThekwini (Durban, South Africa).The CFCC supported these cities in developing and adapting their specific climate-proofing strategies and financing opportunities (Component I); drew on analytical concepts and good practice case studies which facilitated peer-to-peer exchange and compiled a *Sourcebook* for wider knowledge sharing on resilient low-carbon urban development (Component II); and, contributed to international discourse on urban transformation (Component III).In this way, the project supported innovative solutions for urban planning that makes cities 'fit for climate change'.

Box 1: Partner Cities

Durban – eThekwini, South Africa

Located in the province of KwaZulu-Natal, is the largest city in this province and the third largest city in the country. It is a cosmopolitan city of over 3.4 million people (2011 Census). It has a well-managed and busy port, and is also a major centre of tourism because of its warm subtropical climate and extensive beaches.

Chennai, India

Chennai is the capital city of the state of Tamil Nadu, as well as an important district, located in the south east of the Indian Peninsula. It is a cosmopolitan city, with a population of over 7 million inhabitants, and used to be the chief centre of the British empire, with the development of its institutions and administration.

Santiago de Chile

Santiago is the capital city of Chile, located in its central area, in the Metropolitan Region of Santiago.
The city gathers more than 40% of Chile's population, with over 6.5 million inhabitants. The Santiago province is compound by 32 municipalities with its 32 Mayors.

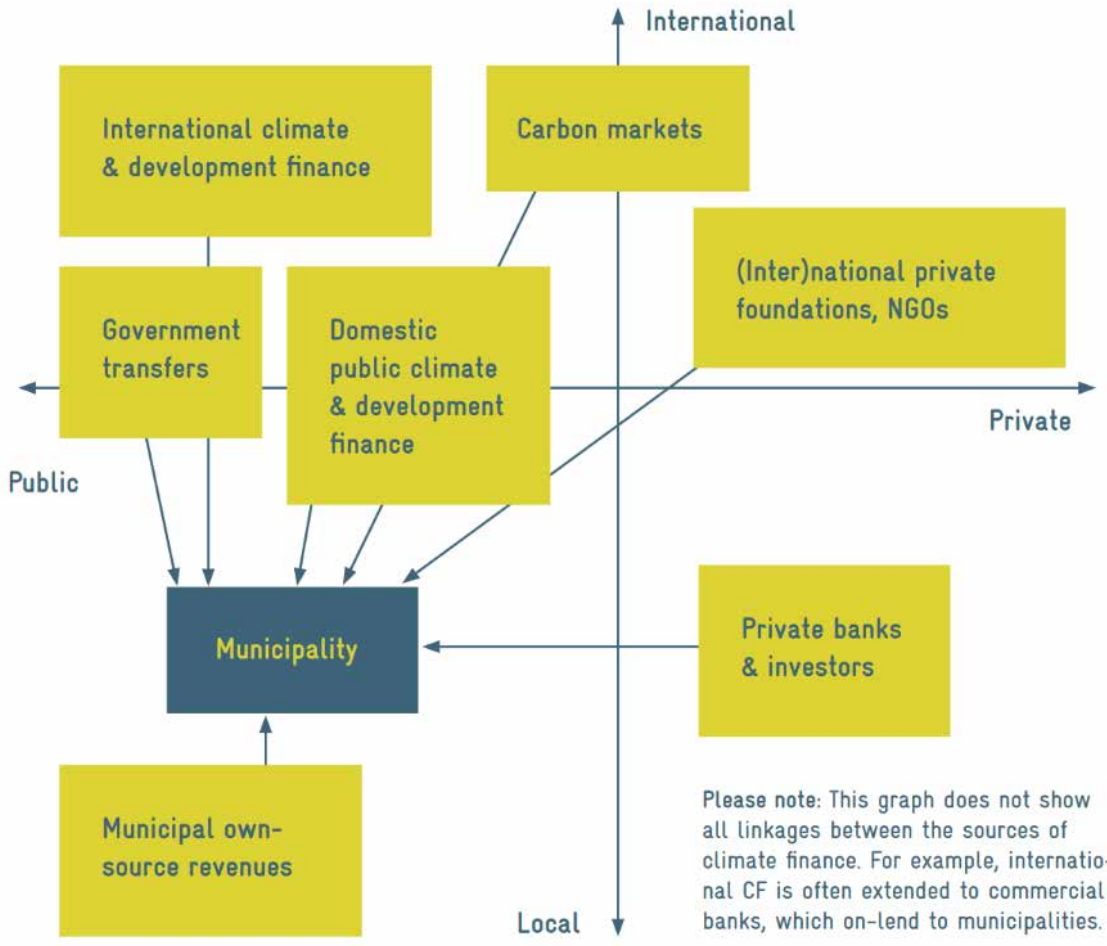
Source:International Dialogue Forum for Climate-Proof Cities, GIZ (August 2018)

CFCC was funded by the German Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety (BMU) in cooperation with the Federal Ministry of the Interior, Building and Community (BMI) as part of the International Climate Initiative (IKI). The project was also involved in the international process leading to the formulation of the 'New Urban Agenda' and now supports its implementation. It also supports the implementation of the Agenda for Sustainable Development and the Paris Agreement within the United Nations Framework Convention on Climate Change (UNFCCC). The project is aligned with the Leipzig Charter on Sustainable European Cities and the Memorandum on Urban Energies.

2. GIZ project initiative

Urban climate finance has emerged as a critical issue, but cities have limited capacity to access finance. As one of its several key activities, the CFCC project commissioned an assessment of the situation of urban climate finance in the three partner countries. The main objective of thestudy was to assist partner cities in identifying and gaining access to available climate financing options.The report, "*Challenges and Opportunities for Urban Climate Finance – Lessons Learned from eThekwini, Santiago de Chile and Chennai*" (Adelphi, 2017), provided new knowledge and recommendations for improving municipal/city access to funding instruments for climate change-related work and for better integrating climate change into planning mechanisms (see Box 2).

Figure 6:Sources of finance for urban climate-aligned development



Source:Adelphi (2017), pp.24

A key finding was that finance and good governance are very closely interlinked.The study noted that sound municipal financial management systems and enabling governance frameworks (at both local and national level) are critical to efforts to secure increased funding for climate action – both from domestic and international sources.A deeper assessment of climate financing models in each of the three partner cities observed the following situation and is helping to inform stakeholder thinking.

(i) **eThekwin**i has recognized that its current model of municipal revenue generation is unlikely to be sustainable in the long term.Currently, itsclimate initiatives are mainly funded from departmental budgets or from multilateral and bilateral funds, with limited private sector financing of urban climate projects. Traditionally reliant on revenues from electricity, water and other services, municipal revenue models are increasingly being challenged by privaterenewable energy generation and growing water scarcity, and the political drive towards achieving renewable energy targets. Furthermore, knowledge of international sources of finance is limited, and there is no single strategy to access climate finance, thus making projects mainly reliant on the available sources of finance.

(ii) In **Santiago**, awareness of the long-term costs of climate change and capacity for climate mainstreaming is low. Chilean municipalities are not permitted to take on debt, and therefore rely on their own sources of revenues, or funds from national and regional governments. International climate finance is usually utilized for the country's forestry sector and for private renewable energy projects outside of urban areas.

(iii) In **Chennai**, projects to develop basic urban services are funded through stable municipal revenues, national and international sources. However, these projects do not always include a focus on climate change. Climate-relevant responsibilities are uncoordinated and dispersed between municipal departments, as no single institutional home exists. This limits an integrated, city-wide action on climate change and resilience. Municipal engineering staff often lack capacity to integrate climate planning into development programmes and remain unaware of available national and international funding sources. As Chennai continues to expand its urban development to peri-urban areas, its climate financing needs are very likely to rise, in order to tackle growingadaptation and mitigation requirements.

3. Key achievements

The CFCC project supported each of the cities in identifying and taking forward innovative, localized solutions for integrating climate change into urban planning.

(i) eThekwini Municipality developed a comprehensive Climate Resilience Implementation Plan for Spatial Planning (CRISP) that integrates climate change responses. South African cities are legally required to develop a 20-year spatial master plan that is reviewed and updated annually. The CRISP tool is therefore enabling the integration of climate resilience in spatial and urban planning, and budgets. It also supports eThekwini Municipality's city-wide climate change adaptation and mitigation strategy, which supports the move to a low-carbon green economy and was developed following the successful hosting of the seventeenth session of the Conference of Parties, and the seventh session of the meeting of the parties to the 1997 Kyoto Protocol developed under the UNFCCC (COP17/CMP7).

The idea for a CRISP tool, and the need to integrate climate change into city planning and governance, came out of the project's CFCC Dialogue Forum in Durban in 2017. The toolalso focused on improving spatial climate resilience in sectors identified in the Durban Climate Change Strategy – for instance, transport and mobility. Actions within CRISP were developed through consultation with sector departments and co-ordination was carried out through the city's Technical Task Team. A significant outcome is that CRISP will form part of the city's climate change implementation plan, to be annexed to the review of the city's spatial master plan and approved by the city council as part

of the masterplan. This will enable city officials to maintain a long-term outlook on the progress of actions.

(ii) In Chile, urban regeneration initiatives are being carried out at municipal level in two areas, Providencia and Matadero. The main challenge is to take regeneration activities forward with minimal disruption, further complicated by technical, political and social factors. The CFCC project helped the two municipalities to navigate these challenges.

Providencia adopted an integrated approach to mobility for its large floating population of two million per day, by taking measures to improve the standards of its public spaces. The zoning plan was one of the first to consider environmental impacts by including planning to regulate green areas and acknowledge the need for disaster management. The planning process includes citizen participation and further seeks coordination between the different transport agencies. Lessons learned have been replicated in other municipal initiatives to improve urban standards in the entire district.

Matadero's Urban Regeneration of Historic Neighbourhoods Programme aims at regenerating central urban areas, while taking into consideration the city's cultural values and heritage. The Ministry of Housing and Urban Development, the Ministry of Economy and the Ministry of Culture came together to redesign the area – whilst adopting an approach towards resolving conflicts of interest between the residents and commercial enterprises in the urban space. The Government plans to replicate this concept in other cities and to integrate it in further government programmes.

(iii) In India, the city of **Chennai** is undertaking several measures to increase the green cover that was substantially reduced following a cyclone in 2016. With the involvement of a local NGO, Chennai's urban planning aims to create open source data to be able to map the city's green cover, and to use communication technology to reach and empower its citizens to take more ownership over newly planted greenery. The project provided capacity-building support to government stakeholders through training and awareness raising on mainstreaming climate change into urban development. Cities were also able to discuss the case study on making Chennai's Buckingham Canal a climate-proof and liveable public space.

The CFCC project also developed a Sourcebook which acts as a knowledge repository.The Sourcebook was developed in a collaborative way with the CFCC's three partner cities and outlines a climate-proof urban approach and a reference framework for cities in their efforts to become more climate-friendly.

4. City-to-city partnerships / South-South and triangular cooperation

The CFCC project supported three interconnected international dialogue forums which helped to introduce climate change issues into local urban planning agendas.The events were hosted by each of the partner cities of eThekwini, Santiago and Chennai and included participants from all partner cities, as well as from other German and Swedish cities. These forums enabled city representatives to network with other cities, share and learn from each other's experiences on innovative approaches to climate-proof urban planning, management and development, and to benefit from peer-to-peer knowledge exchanges.

The first forum in Durban, "From challenges to solutions - How to improve integration of climate change aspects into urban development instruments, strategies and initiatives?" convened participants for the first time and brought a shared understanding of mainstreaming of climate change into urban agendas.

The second forum in Santiago, "The governance of local climate action and how to foster multi-sectoral collaboration", took this further. It enabled participating cities to produce feasible solutions to bring integrated urban development within a multi-stakeholder context.

The third forum in Chennai, "From planning to implementation" built on the outcomes of the previous two forums. It focused on processes from policy to action by using practice-oriented learning from existing case studies, thereby building a bottom-up approach. It enabled participants to learn about municipal practices in climate-proof urban development experiences from the participating cities, identify institutional patterns and elaborate ideas to facilitate more climate-proof urban development, and actively participate in and contribute to further developing a climate-proof urban development narrative.

The Dialogue Forums were structured to enable exchange of good practice examples from the cities and for use in other international exchanges with cities around the world. The forums were seen as powerful mechanisms to initiate a practice-oriented learning process over the duration of the project that included different learning formats. It also sought to strengthen the capacities of urban practitioners, and to examine innovations in spatial planning and policy, which can lay the groundwork for conceptualizing a new climate-proof urban development approach.

5. Conclusion

Efforts to cope with climate change begin in cities. As climate change and urbanization provide new challenges, the costs of inaction will be high. Cities need to take action by developing forward-looking strategies for mitigation and adaptation. The CFCC project found that strategic planning and climate governance are key to attracting climate finance. Building the capacity of local governments is important, not only in increasing knowledge of integrated approaches to climate-proofing urban development, but also in raising awareness of diverse domestic and international funding sources. A robust business model can also be an important consideration for the private sector to become involved in local climate action.

Learning from practical case studies can be a powerful way to engage and build support among multiple stakeholders with diverse interests, and to show how climate change can be interrelated with urban development. The process brought stakeholders around a common set of issues, facilitated exchange of ideas and knowledge, and promoted innovative measures. It also showed how NGOs and residents can play an active role in developing climate change strategies at city level.The three cities of eThekwini, Chennai and Santiago came together in a collaborative way to look at climate-proof urban development in a holistic manner. The CFCC project has helped them to progress from policy to action.

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UN ESCAP: Ocean cities delivering resilient solutions in Pacific island settlements

Abstract: Ocean Cities are uniquely at the forefront of the consequences of climate change , the challenges of urbanisation and other development pressures. OceanCities need to address these challenges if they are to grow in an equitable and environmentally sustainable manner. UN ESCAP pioneered an approach to support Ocean Cities to identify, prioritize and tackle their urbanization and climate change challenges through a platform of South-South cooperation, knowledge exchange, and policy briefs.It not only helped to raise the voice of Ocean Cities and Small Island Developing States but has also built a collaborative platform for future joint action.

Photographer:**S. Chape©**

Ocean Cities are where urban landscapes and seascapes meet, where built and natural environments near coastlines interface, and where human behaviour and urban development have profound impacts on both terrestrial and marine ecosystems.

1. Context

Ocean Cities face multiple threats and challenges, including:climate change and natural hazards, storms, tropical cyclones, salt water inundation, earthquakes, tsunamis and volcanic activity. The size, geography and dependence of these cities on precious natural resources presents complex challenges for sustainable development. The Fifth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC) highlighted the adverse impacts of climate change on the livelihoods, coastal settlements, infrastructure, ecosystems and economic stability in

Small Island Developing States (SIDS).It further noted the risks from sea level rise and higher water temperatures on coastal islands and coral reefs which are significant contributors to tourism and fishing industries. The United Nations Framework Convention on Climate Change (UNFCCC, 2005) further highlighted that the vulnerability of SIDS to climate change was expected to worsen with each passing year.

Cities in the Pacific are witnessing continuous and rapid urbanization, which pose large infrastructure and service delivery challenges.Coral Reefs, mangroves and coastal ecosystems act as natural barriers against ocean storm surges and saltwater intrusion.However, these coastal ecosystems are under threat from unplanned urban expansion and marine pollution.Most Pacific island communities and economies are dependent on healthy coastal and ocean resources, but these are often depleted by increasing human populations and unplanned urbanization. Furthermore, these cities also face systemic issues in tackling these challenges due to complex dual land tenure mechanisms, lack of vertical and horizontal integration of government, political inaction; a lack of platforms for multi-stakeholder dialogue; and looming loss of culture and 'brain drain' associated with urbanization and migration.Food and water security are subject to significant pressures, and waste management challenges are also overwhelming many urban systems.

Ocean Cities are keen to take action and adopt local solutions to address both current and future urban growth and environmental concerns. For instance, in the Ocean Pathway launched at COP23, Fiji's Presidency emphasised the importance of action in coastal cities, towns and settlements for ocean health.

The United Nations Economic and Social Commission for Asia and the Pacific (ESCAP) recognizes the importance of addressing the interlinked issues that are characteristic of Ocean Cities in an integrated, ocean-focused and climate-responsive manner. This integrated approach is vital for sustainable development within island systems, including the achievement of SDG 11 (make cities and human settlements inclusive, safe, resilient and sustainable), SDG 13 (take urgent action to combat climate change and its impacts) and SDG 14 (conserve and sustainably use the oceans, seas and marine resources for sustainable development).

2. Ocean Cities Initiative

At the launch of the Ocean Pathway, at the 2017 Conference of the Parties to the United Nations Framework Convention on Climate Change, ESCAP pledged its support for building resilience, lowering greenhouse gas emissions and protecting ocean health in coastal island cities. The Ocean Conference called for strengthened cooperation and partnerships to protect and restore the health of oceans, and ESCAP submitted a voluntary commitment to establish an Ocean Accounts Partnership for the Asia-Pacific Region.

Box 3: The 2017 Declaration adopted, at Ministerial Conference on Environment and Development, and the Regional Road Map for implementing Agenda 2030 in Asia and the Pacific, mandates ESCAP to:

(i) **create environmentally sustainable cities** through sustainable urban planning and spatial development;
(ii) **promote the sustainable use of the oceans and seas** to conserve the environment, protect biodiversity and enhance the welfare of the community; and,
(iii) **build capacity** among governments and stakeholders for climate action and resilience through policy dialogues.

In 2018, ESCAP followed this up with the **Ocean Cities Project** – which established a new partnership with Pacific Island Developing States to develop an integrated policy approach for ocean-

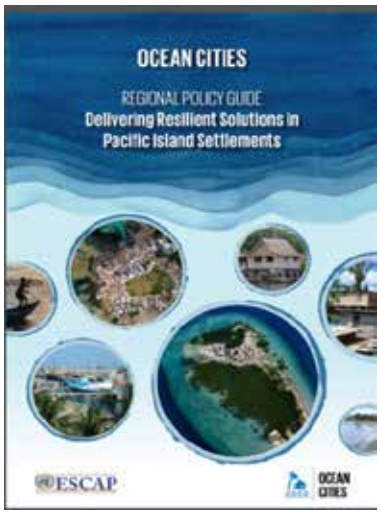
focused and climate-responsive urban development strategies adapted to island systems.

The Ocean Cities project introduced an integrated nature-based approach for ocean-focused climate-responsive urban development that is adapted to island systems and local, national, regional and global development plans.Within the context of ongoing urbanization processes in the Pacific Island States, and drawing on local knowledge and experience, the ESCAP project recognized the important links between the impacts of urban growth and development, ocean health and coastal systems and the effect of these factors on the development and resilience of Ocean Cities.The primary beneficiaries were local and national governments in the Pacific Island States. However, the project has built the basis for future collaboration, and its outcomes are applicable more broadly in the ocean city context.

3. Key achievements

Under the Ocean Cities project, ESCAP produced three policy briefs as follows:

- The Ocean and the City
- Building community resilience
- Re-naturing urbanization



These informed the development of *An Ocean Cities Regional Policy Guide* which was launched at the Fifth Pacific Urban Forum in Nadi, Fiji in July, 2019.The guide was developed in partnership with Pacific Island developing States and promotes an approach that links the impacts of urban growth and development, climate change impacts, ocean health and coastal system and their effects on Ocean Cities. The framework of analysis was derived from a qualitative synthesis of ocean-focused, climate-responsive and nature-based urban development strategies adapted for Pacific Ocean Cities. The approach to "blue" urban development strategies was heavily influenced by the available literature on nature-based solutions.

The policy briefs highlighted priority themes and brought new knowledge to Pacific regional stakeholders as follows:

i) Nature-based solutions in Ocean Cities matter. The practice of working closely with nature to create human settlements while maintaining healthy ecosystems is not new and, indeed, is a cornerstone of many indigenous belief systems. Viewed through an ocean-focused lens, nature-based solutions should be explored for the urban challenges and needs of the SIDS.If carefully and holistically designed, nature-based solutions can produce win-win situations across multiple connected social-ecological-economic systems. Employing an integrated, participatory nature-based solutions approach to addressing societal challenges is an important way of taking complex ecological and socio-cultural issues into account, as well as a long-term tactic to improve human resilience and well-being, with notable additional ecological co-benefits. It may not always be possible or appropriate to place financial value on nature-based solutions; economic valuation alone can omit or misinterpret socio-cultural values. It is, therefore, necessary to take a holistic approach to valuing the various benefits and trade-offs associated with nature-based solutions and to understand that that value will change over time.

Examples of nature-based solutions to climate change in Ocean Cities

ii) Advancing implementation requires partnerships and resources: An enabling environment for solutions to be implemented requires a wide range of resources, partnerships and meaningful engagement from countries and stakeholders at regional, national and local level.

Furthermore, access to finance is required for major, transformative resilience-building initiatives. Such initiatives are usually dependent on state-level actions to undertake reforms that empower local governments through intergovernmental transfer systems, efficient revenue collection and support for creditworthiness. This creates more certainty for subnational investment and frees up municipal decision-making. Leveraging climate finance for ocean-focused sustainable urban development is an opportunity to protect vital carbon sinks and build resilience against climate change impacts in Pacific Ocean Cities.

*iii) Elevating a "blue" urban agenda requires political will.*Ultimately, the strengthening of political will is needed to elevate and adequately prioritize urban issues and resilience in the Pacific Region. A strengthened strategic Pacific regional approach to managing urbanization and Ocean Cities resilience is also crucial.

*(iv) Building meaningful partnerships with all stakeholders is key.*An all-of-society approach, along with multi-stakeholder partnerships aligned with customary practices is essential. Increasing youth and women's engagement is especially important.

(v) Strengthening capacities to build resilience and action. Island settlements, at the nexus of ocean health, climate change and urban development, need to build anticipatory, adaptive, absorptive and transformative capacity in the face of myriad complex stress factors. Strengthening the role of urban spatial planning and design is also key to increasing resilience.

(vi) Improving evidence for action. Mapping spatial and socioeconomic vulnerability in urban systems and improving technical capacity for research and data collection are crucial first steps towards improving evidence for building resilience in Pacific Ocean Cities.

4. City-to-city partnerships / South-South and triangular cooperation

ESCAP facilitated a knowledge exchange workshop that helped to build shared knowledge and understanding on key themes for Pacific cities. The event, "Promoting nature-based solutions in Pacific Island Settlements" took place at the University of the South Pacific in July 2018.Held as a side event to the 2018 Pacific Update Conference, the workshop brought together over 30 national and local governments, non-state actors, regional institutions and academia, and development partners, to exchange knowledge and experience of urban development challenges in Pacific islands. The objectives were to:introduce ESCAP's Ocean Cities initiative; bring stakeholders together in a common platform to discuss the needs and challenges of ocean-friendly urban planning and development in Pacific towns and cities; and identify opportunities, solutions and innovations to respond to these challenges, as well as potential obstacles, in applying these solutions across countries.

Participants called for cities to be recognized as places of transformation where multiple issues related to the ocean, climate change, resilience and poverty elimination intersect. The knowledge exchangeidentified a number of challenges, priority issues, as well as opportunities and solutions in Ocean Cities for more integrated urban development. Challenges mainly related to limited land and fragmented land tenure,inter-island migration, and difficulties of setting up legal frameworks to regulate sustainable coastal development and incentivize coastal developers to 'work with nature' (e.g. through innovative financing mechanisms, such as bonds).

Participants highlighted the need for smart solutions and better data to support coastal resilience measures and balance economic and environmental issues.They highlighted the need to build the capacity and powers of city planners and councils, strengthen multi-stakeholder partnerships in cities for a more coordinated governance response, build on traditional solutions, engage the community and youth, and raise awareness through community organizations and education. Participants also suggested a Pacific regional approach to urbanization, including a more appropriate definition of cities based on population density (rather than a threshold of number of inhabitants), and the characteristics of urban living – such as reliance on urban services and infrastructure and more complex or fragmented governance systems linked to complex land tenure systems.

Policy briefs served as building blocks for a regional policy guide to assist Ocean Cities to adapt sustainable urban development to island systems.Following the validation of priority themes at the knowledge event, the project subsequently developed a series of policy briefs, in partnership with the Pacific Centre for Environment and Sustainable Development at the University of the South Pacific, on bridging the built and natural environments for urban development in island States, in line with Pacific priorities. As such, their focus was on supporting the integration of nature-based solutions and strengthening of community resilience as key opportunities for Ocean Cities.An integrated 'Ocean Cities Policy Guide' was developed, which identified opportunities to bridge the gap between the built and natural environment. The broader policy guide includes case studies to share knowledge of good practices.

The project unlocked further networking opportunities and continues to promote strengthening of a regional voice of Ocean Cities in climate and urbanization forums.It has helped to strengthen the "Friends of Ocean Cities" network of experts/ practitioners. Participants were also invited to participate in other peer learning events such as the Asia-Pacific Day for the Ocean (November 2018), The Future of Asian and Pacific Cities Report Pacific Consultation, the 5th Pacific Urban Forum, and the 7th Asia Pacific Urban Forum (2019).

5. Conclusion

The Pacific faces high exposure to extreme weather and climate change. The UN estimates that 50 million people live in Small Island Developing States (based on data from 1990-2002). Small islands remain aid-dependent, and several international development agencies are partnering with SIDS to promote renewable energy and climate adaptation projects. However, less attention has been focused on supporting climate change planning in urban cities and towns – which are facing rapid urbanization.

ESCAP's Ocean Cities project initiative adopted a unique approach of convening stakeholders and facilitating South-South cooperation and knowledge sharing through a mix of policy briefs and workshops and drawing on local knowledge and experience. This process is also contributing to empowering Ocean cities to make their own climate-smart adaptation choices, forge partnerships and strengthen their regional voice on sustainable development.

ESCAP continues to promote new knowledge to realizing a sustainable urban future. A new report, *"The Future of Asian and Pacific Cities 2019"* has recently been produced by ESCAP and the United Nations Human Settlements Programme in partnership with the Asian Development Bank, Centre for Liveable Cities Singapore, the European Union, The Rockefeller Foundation and the United Nations Development Programme. The report provides best practice guidance to national and local governments on a range of issues including long-term integrated urban planning toadvance resilient and sustainable cities, urban finance, data and technologies for smart cities, and capacity-building.It also proposes to strengthen partnerships amongst diverse sets of urban stakeholders to achieve the 2030 Agenda for Sustainable Development and New Urban Agenda at city level in the Asia-Pacific.

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Guidance, peer review and advice: Friends of Ocean Cities network

Brazil, São Paulo: Solutions for urban transportation and waste management

Abstract: São Paulo's Greenhouse Gas inventory (2011) showed that the main greenhouse gas emissions come from transportation and waste. The municipal administration has subsequently taken several steps to reduce congestion and emissions in the transport sector, such as by introducing bus-only corridors, increased enforcement, and reduction in speed limits. Waste management initiatives include composting and electricity plants that burn biogas generated in landfills.Initial results are impressive, paving the way for São Paulo to share its experiences with other megacities globally.

1. Context

The modern, dynamic city of São Paulo is the biggest in Brazil and one of the largest agglomerations worldwide.The heterogeneity and diversity of São Paulo and its residents, and the unequal urbanization between wealthy central and economically weaker peripheral areas poses complex challenges to its urban planners and managers, as a uniform solution is inadequate to serve the needs of a diverse population.

São Paulo

Population: 11 million inhabitants (>22 million in the metropolitan area).

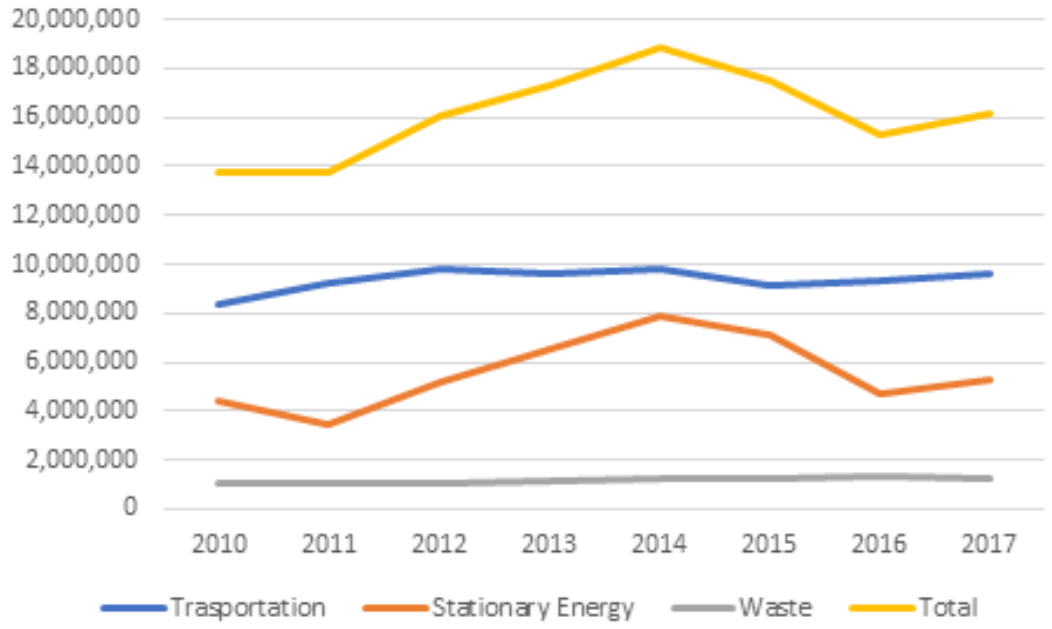
Urbanization Rate:99.1%

Population Density: 7,400 people per square kilometre.

City Authority: São Paulo International Affairs Executive Secretariat Municipality of São Paulo

The city conducted its first greenhouse gas inventory under IPCC 2006 methodology. The results, which showed transport (82 percent) and waste (16 percent) as the main sources of emissions and were instrumental in spurring action by city officials.The current inventory, stillin course of completion, was performed under the Global Protocol for Community Scale Inventories (GPC), Basic mode, and its results are different: transportation and stationary energy account for 92% and waste around 8% of total emissions.

Figure 3:GHG Emissions in the Municipality of São Paulo 2010-2017, under the GPC methodology, Basic mode (tonCO2e), still in verification, except 2017, already checked



A significant challenge is that of public transport – particularly in terms of stressed infrastructure and overcrowding . Researchers found that, on average, people spend three hours a day in traffic. São Paulo has over 7 million motor vehicles on the road (estimated to have grown 59% since 2003).People with income in the top quintile live in the central part of the city and rely on cars for transportation. A large part of the population, mostly with incomes in the lower quintiles, tend to live in peripheral areas and are reliant on public transport representing 74% of motorized trips. A further challenge is that metro and train services do not yet extend beyond middle-class areas. Tax incentives for buying new vehicles and increased purchasing power are also reinforcing car-dependency. More people are using taxis, and the Destination Origin Survey in 2017 shows that its share of transport modes has risen by over 400% in recent years.Furthermore, the city also faces pressures of drinking water shortages, basic sanitation, waste management and affordable housing.

With rapid urbanization, these challenges are set to rise:pollution (mainly vehicular) kills 3,500 residents annually and the economic productivity losses alone are estimated at $350 million. Data from a recently published survey (WHO Global Urban Ambient Air Pollution Database, 2019), which analyses air pollution in 3,000 cities across the world, shows that pollution rates are double the ceiling established by the World Health Organization for acceptable air quality.

2. City actions

Transport and waste management fall under the responsibility of local authorities. The Municipality of São Paulo has been leading efforts to address these issues to improve the quality of urban life and reduce existing inequalities through better urban planning and accessible transport. The city has also created a Municipal Committee on Climate Change and Eco-Economy.

A unique feature of São Paulo's approach is that the municipal agency has established continuous and informal collaboration with universities and researchers.This includes collaboration on analysis of emissions scenarios and their impacts on public health, and to improve knowledge about different types of emission (CO_2, ozone, aerosols) and their sources (transport and waste).São Paulo also supports research processes with academic institutions and companies, e.g. the use of new bus or air pollution control technologies, and also works with the automotive industry in promoting tests and monitoring gas emissions.

São Paulo is one of the first local governments in Brazil to have instituted a Municipal Climate Change Policy Act (2009). This Act established guidelines, most notably, on promotion of the use of renewable energy and the gradual replacement of fossil fuels by alternative fuels with lower greenhouse gas emissions.

A new 16-year Strategic Master Plan (2014) brought in significant measures related to urban mobility and is moving the city from a car-centric approach towards efficient multimodal transportation. This includes the extension of exclusive bus lanes and corridors to give priority to buses over individual transport, incentives to improve fuel consumption, increase in the number of subway stations, and the installation of bicycle lanes. Furthermore, the Master Plan promotes affordable housing for low-income communities, and introduces a public housing policy in line with sustainable urban mobility principles.

In January 2018, an amendment to the Climate Change Municipal Policy was established by law which defined new emission reduction targets for the municipal bus fleet of São Paulo. This requires the city's public transport operators to promote the progressive reduction of fossil-

derived CO_2 emissions and toxic pollutants emitted in the operation of their fleets, with the gradual use of cleaner and more sustainable fuels and technologies.

To encourage a shift in modes of transportation, the city created the *Pro Ciclista,* a City Hall Executive Group for Cycling Improvements.Bicycling infrastructure was expanded exponentially by more than 400km by 2016.Twelve bridges were adapted for cycling, 8,000 bicycle racks were placed across the city along with bicycle parking at all bus terminals, and a bicycle-sharing programme provided 1500 bicycles at 158 stations.

Photo:Bicycle sharing system (Municipality, 30 January 2018)

A target of avoiding 131,000 tCO_2 emissions from waste has been set by the Government. The design of a new public waste management scheme in São Paulo is under way, alongside a city-level solid waste integrated management plan. This is being done in cooperation with the Brazilian Association of Public Cleaning and Special Waste Companies, the Climate and Clean Air Coalition and the International Solid Waste Association.

3. Key achievements

São Paulo's efforts have been recognized internationally. The city won the Sustainable Transport Award (2014) for its work in countering transport congestion. In 2013, São Paulo's rapid bus system corridor, Expresso Tiradentes, was awarded "Silver" status by the Institute for Transportation and Development Policy (ITDP) for meeting criteria established by the BRT standard, elevating its international ranking and serving as an example of best practice for other cities. The estimated impacts of this corridor include time savings of 74% for passengers. The city has also significantly improved its ranking in the global traffic congestion index of 295 metropolises, falling from 7th worst for traffic delays in 2013 to 58th worst in 2015 , (TomTom Traffic Index, 2016). This remarkable achievement, the result of actions by the municipal administration, is also leading to a reduction in greenhouse gas emissions. Transport improvements are estimated to have reduced CO_2 emissions by 1.9 tons per day (ITDP, 2016).

Levels of pollutants released into the atmosphere are falling, with corresponding positive health impacts. The implementation of public policies on motor vehicle pollution control, and the addition of ethanol from sugar cane to gasoline have been some of the progressive measures. For instance, following a vehicular inspection and maintenance programme for 75% of the transport fleet, a study estimated that there was a corresponding 28% reduction in PM emissions with positive impacts on health, and reduced hospitalizations and mortality among the urban population. These measures have in turn incentivized the development of more efficient and less polluting engines.

A Solid Waste Integrated Management Plan has been put in place and is delivering positive results.Waste in landfill sites is a significant source of methane emissions that contribute to climate change and air pollution. Composting of waste prevents these methane emissions. So far,

two electricity plants, using methane generated in landfill, are operational, with a capacity of 22MWh each. This makes for a cleaner Brazilian energy matrix, as the country has a National Interconnected System that provides electricity nationwide. The Climate and Clean Air Coalition provided technical assistance to the city to replicate the pilot project in other districts. The city has now piloted five compost units with around 55 tons of organic waste per week for each unit and, based on the good results, is planning to expand to 17 units by 2020. The approach involves the collection of rich organic materials from street markets and from pruning parks and gardens. The methodology adopted ensures that no unpleasant smells are produced and that it does not attract insects or other disease vectors. The current administration is committed to launching a total of 20-25 composting plants.

Positive societal behavioural shifts are starting to become evident.Even in times of traffic congestion, bus lanes are still exclusively respected and maintained.These measures have enabled buses to increase average speeds by 21% (currently 20km/h and 17km/h in exclusive lanes), in pursuit of the goal of achieving speeds of 25km/h. Furthermore, despite some initial resistance to the expansion of bicycling infrastructure and the bicycle sharing programme, the cycling culture has become popular with its citizens.

4. City-to-city partnerships / South-South and triangular cooperation

São Paulo has an International Affairs Coordination responsible for the City's relationship with other countries. There are almost a hundred consular representations in the city liaising to promote South-South cooperation activities.As São Paulo is characterized by extreme diversity, it offers examples of the best and the worst of urban conditions, and the city therefore receives many delegations from other cities across the world.

São Paulo has several international agreements with other cities abroad.These include:45 twinning agreements and 35 bilateral cooperation agreements; of which 27 and 13 respectively are with cities in the Global South. There are also eight multilateral cooperation agreements with international organizations in the United Nations System, as well as with ICLEI, C40 and other similar associations.

São Paulo participates in a number of international forums. Most significantly, it participates in the CB-27, Forum of Environment Secretaries of Brazilian States Capitals, which promotes a strengthened agenda of sustainability and better practices, including commitments to climate change, promoted by the Konrad Adenauer Foundation.This Forum hosts national and regional meetings that bring together government officials responsible for environmental policies at local level.It also supports technical visits and international missions to exchange experiences and promote environmental agendas.

5. Conclusion

The city of São Paulo is adopting bold new concepts adapted to, and supporting, its urban transformation. These involve public policies linked to climate change and committed to sustainable practices as they relate to urban spaces.São Paulo is also finding success by adopting approaches that go beyond traditional and conventional engineering solutions. The most significant achievements can be seen in the transport and waste management sector, thus offering lessons to other cities facing similar challenges.

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Ethiopia, Addis Ababa:Modal shifts from Road to a green Light Rail Transit

Abstract:The city of Addis Ababa in Ethiopia has introduced the first Light Rail Transit (LRT) in eastern and sub-Saharan Africa that is fully powered by renewable energy.This bold move has not only increased mobility and connectivity for people in the city but is also expected to stimulate the economy and reduce carbon emissions as part of the country's green growth strategy.Built through technical and financial cooperation with the People's Republic of China, the project is evoking wider interest among other African countries and offers several lessons for its replication regionally.

Train operating on the light rail in Addis Ababa, Ethiopia.(Photo: Xinhua/Sun Ruibo, 20 September 2015)
http://www.xinhuanet.com/english/2019-04/27/c_138015842.htm

1. Context

The lack of mobility and affordable transport is a significant challenge for cities as public transportation systems are increasingly under stress and unable to meet the economic and social needs of their urban populations.A further challenge is related to the need for public transport systems to reducing their emissions to meet climate mitigation targets, while sustaining healthy urban economies (Procter, Bassi, & Araujo, 2017).

Addis Ababa:

Population: 3.5 million (2007 census)

Urban Land Area:203 sq miles

Nodal Authority: Ethiopian Railway Corporation (ERC)

Urban rail transit systems are increasingly considered as potential mitigation measures to reduce greenhouse gas (GHG) emissions from rapid urbanization of cities to combat climate change.Many national governments have established or proposed city-level passenger rail systems to reduce CO2 emissions from their transport sector.The growth in use of renewable electricity by railway operating agencies has also been growing at a rapid pace (IEA and UIC, 2016).

Modal shifts away from road transport to rail-based mass rapid transport are intended to reduce the need to develop additional road infrastructure to meet the demand of a rapidly growing fleet of cars, buses, taxis and trucks.In Africa, the use of Light Rail Transit (LRT) and Bus Rapid Transit (BRT) systems are growing in popularity. For example, governments in South Africa, the United Republic of Tanzania, and Ethiopia are investing in these modern public transit modes. Such developments could potentially advance conventional fossil-fuels based public transit modes including city buses, mini-buses and taxes in many African cities (Impact Engineered, 2018).

The landlocked country of Ethiopia has experienced rapid urbanization coupled with economic growth, but its public transportation systems have been unable to keep up with rising demand.The roads of Addis Ababa are congested with traffic – public transport largely consists of state-run buses and minibus taxis; city commuter demand for transportation facilities has doubled in the last two decades and has been largely unmet. Traffic congestion and limited public transportation choices are limiting the mobility of city residents and significantly increasing their commuting time and costs.

Although transport sector emissions contribute 3 percent to Ethiopia's overall GHG emission, these are estimated to rise 7-fold, from around 5 Mt CO2e in 2010 to 40 Mt CO2e in 2030 when following a business-as-usual (BAU) scenario.Currently~75 percent of the emissions come from road transport, particularly freight and construction vehicles, and to a lesser extent from private passenger vehicles.The passenger road transport fleet of 240,000, mainly consists of inefficient vehicles that have an average age of 15 years, with an estimated consumption of 0.6 billion litres of imported fossil fuel according to government statistics (2010).

In Ethiopia, the rise in conventional fossil-fuel based mode of transport has increased.There has been a significant increase in GHG emissions from the transport sector, which is projected to continue under a business as usual scenario.In 2011, fossil fuel-based modes of transport accounted for 11.3 billion passenger- kilometre travelled in urban areas in Ethiopia. Under the BAU scenario, this has beenforecasted to grow to 570 billion passenger kilometres, leading to transport-related GHG emissions of 2.78 million tCO_2e by 2050 (CRGE,2011).This has also created air pollution posing health and safety risks, impeding economic development and producing more GHG emissions.

Addis Ababa city's transport sector accounts for 47% of CO_2 emissions (C40, 2016). Improvements to public transport from Addis Ababa LRT system, therefore, have the potential to significantly contribute to its plans for reducing GHG emissions, as well as providing socio-economic, environmental and sustainability co-benefits (Metropolis, 2018).

2. City Initiative

Ethiopia is pursuing a new sustainable growth model, reflected in its national Climate-Resilient Green Economy (CRGE) plan.The CRGE commits to building a green economy to help realise Ethiopia'sambition of reaching middle-income status by 2025.Transport has been identified as one of the abatement levers intended to drive the transition to a green economy given its GHG abatement potential and sustainable development benefits.

The Government has stated its intention to seek development partnerships to help implement this strategy.The CRGE has estimated significant GHG emission reductions, of 9 million tons of CO2/ year by 2030 (CRGE, 2011), resulting from the development and implementation of the electric-driven smart transportation systems (including the national railway network (NRN), and the LRT and BRT in Addis Ababa, and other projects such as the use of electric vehicles).

Consequently, a national sustainable urban mobility strategy – the *Sustainable Mobility Programme for Major and Emerging Urban Centers of Ethiopia is under implementation.*This has brought national and city governments together to tackle the problem of urban transportation, and in September 2015, the city of Addis Ababa launched the first Light Rail Transit (LRT) system to be built anywhere in sub-Saharan Africa. This contributes significantly to Ethiopia's plans to introduce fuel-efficient or renewable energy based public transit schemes in urban centres, and the LRT system was therefore also intended to provide an alternative to the city's road-based transport system, reduce the cost and time for passengers, and bring environmental benefits – such as reduced air pollution.

Ethiopia's Railway Corporation (established in 2007), is a state-owned enterprise that operates passenger and freight transport services.It operates as the nodal agency for the LRT system.The project involved multi-stakeholder collaboration across the Ethiopian government, China's Export-Import Bank, and the Chinese government which involved financing, technical support and capacity building.

The LRT system has a total length of 34.25km with 39 transit stations across the city.The system operates in two lines: the east-west Green line (17.35km) and the south-north Blue line (16.9 km).The project has the capacity of moving 60,000 passengers per hour (15,000 to each of the four direction per hour) and has maximum design speed of 70 km per hour (ERC, 2016). The power distribution stations of the Addis Ababa LRT system are built along all four corridors of the railway, feeding electricity to power the trains with a total installed power capacity of 66.1 Megawatt(MW).Power supply to LRT system is powered by 100% renewable energy sources from hydropower, and wind energy.

3. Impacts / Results

This case study draws extensively on a technical research paper (Senshaw,Dereje Azemraw et al., 2019) and therefore limits its reflections to three main results areas as follows:

Energy Consumption:

According to data retrieved from ERC, the annual energy consumption of the Addis Ababa LRT system was around 19.38 million kilowatt-hours.The study (Senshaw et al.,) assessed and calculated the operational phase CO_2 emission reductions from the Addis Ababa LRT system – which is powered by 100 percent renewable energy sources – based on sources from hydropower (93 percent), and wind (7 percent) energy.

When the Addis Ababa LRT is fully operational since September 2015, the study estimates that the project could significantly contribute to an additional 26% emission reduction – or an annual increase in CO_2 emission reductions from existing 13,669 t to 18,454 t CO_2 annually.This would also translate to increased energy consumption from 19.38 to 26.17 million kilowatt-hours. Saving on fossil fuel expenditure could also increase to USD 1.5 million per year.

Emissions Reduction

Emissions reductions are significant and could be increased further when the LRT operates at full capacity.At the current operating capacity, the study estimated that the Addis Ababa LRT system reduces about 13,669 t CO_2 emissions annually.

However, in comparison to operational performance in Chinese cities, the LRT's

estimated CO_2 emission factor was found to be 20% higher than Shanghai metro.According to the study, the LRT emissions factor was estimated at 53.4 g CO_2 or 0.076 kWh per passenger-kilometres, while that of the Shanghai metro was estimated at 0.015 kWh per passenger-kilometres (ClimateTeckWiki, 2017).However, the study acknowledges that there are several factors, beyond renewable energy sources,such as types of track lines and operational modalities that could also contribute to this difference.

Passenger benefits

The main anticipated social and economic benefits include: health benefits from a decrease in particulate emission and air pollution; reduced commuting time of passengers to work; increased investment and livelihood opportunities.However, there have also been some questions regarding the economic costs of building and financially sustaining the LRT, and the models of operation.

Ridership has increased and passenger demand for the LRT remains high. The LRT has transported over 38.36 million passengers annually (July 2017-June 2018) and generated USD 4.14 million (ERC, 2018). Further analysis shows that the blue line moved 16.14 million passengers while the green line has transported 22.12 million passengers.Besides the immediate benefits of connectivity and mobility, passengers also benefit from affordable rides.The average ticket cost is approx. $0.30 and this benefits people with low-incomes. However, middle-class commuters also benefit from the LRT system.

The operational capacity is 256 million passenger kilometres annually, but the LRT is still operating at 40% carrying capacity (115 passenger kilometres). As of June 2019 an average 30-32 of the 41 trains of the LRT system were functional and operational. The major challenges resulting in underperformance of the LRT have included technical problems, lack of spare part supplies for routine maintenance and power interruptions. These challenges resulted in delays or cancellations requiring passengers to find alternative modes of transport.

Measures for safe mobility have been identified. Consistent with the UN Decade of Action which calls for safer roads and mobility, in another study, the WRI Ross Centre conducted a road safety inspection of Addis's LRT corridor, with the Bloomberg Initiative for Global Road Safety in 2017.[46] The study looked at all 39 stations on the green and blue lines. The main findings included:(i) A lack of safety measures in street and station designs. Passengers in stations faced poor accessibility due to poorly marked traffic crossings, lack of night light, and poorly constructed ramps and stairs. Furthermore, other modes of transport run alongside the LRT corridor as it runs across the city, therebycreating traffic congestion; and, (ii) Speed of traffic and lack of safety measures at pedestrian crossings to LRT stations makes conditions unsafe for pedestrians.These audit recommendations were shared with different transport agencies and a plan to implement the recommendations has been developed by the city authorities.

4. City-to-city partnerships / South-South and triangular cooperation

The main barriers for Addis Ababa in the preparation of transport-oriented development were related to lack of practical knowledge of operationalizing this system, limited access to finance and gaps in the regulatory framework.Accordingly, the city sought a model of South-South Cooperation, based on a bilateral treaty between Ethiopia and China, which enabled the city of Addis Ababa to benefit from Chinese technical expertise, knowledge and the reliability of financial resources.

46 https://www.bloomberg.org/program/public-health/road-safety/#progress

Several Chinese partners were engaged in the project. China Rail Engineering Corporationwas mainly involved in construction; while Shenzhen Metro Group and China Railway Engineering Corporation have been tasked with training Ethiopian staff, providing knowledge transfer, and with using its knowledge to initially operate the LRT until 2020. Technical assistance provided by Chinese counterparts included feasibility studies, concept design, site investigation, data collection and environmental and social impact assessments.Furthermore, Chinese firms delivered the trains and provided technical support for the construction of the tracks.

Ethiopian Trainees in Addis Ababa (Source: Xinhua, July 2018)[47]

Ethiopian local staff of the LRT benefitted from training provided by Chinese experts which included on-the-job training in Addis Ababa, as well as through study visits to China.Additionally, train drivers and maintenance staff received training from Chinese engineers.This was followed by intensive hand-holding support by Chinese counterparts.

Three years after the start of the commercial operations of the LRT, its functionshave almost entirely been transferred to local Ethiopian management.

The Ethiopian Railway Corporation have subsequently signed a grant agreement (2018) with the Chinese government for the construction of a new railway academy in Ethiopia that will provide further operational and engineering training skills. Ethiopia and China have also separately partnered on an international railway line from Addis Ababa to Djibouti Port which has been operational since 2016.This USD 3.4 billion project has been financed by China's Export-Import Bank, the China Development Bank, and the Commercial Bank of China, with technical and operational support provided by China Railway Group and China's Civil Engineering Construction Corporation (EPA 2016).

Ethiopia is looking to Climate Finance for the future.Ethiopia has subsequently provided co-funding of USD 1.2 million for preparation of a bankable feasibility study to develop pilots in support of its plans to expand the LRT.Through its Nationally Appropriate Mitigation Actions (NAMA) international climate finance of USD 7.7 million has been sought to increase capacity, develop knowledge, prepare a regulatory framework including instruments to lower risks for private investment, and to prepare Monitoring Reporting and Verification (MRV) systems.

47 http://www.xinhuanet.com/english/2018-07/21/c_137339710.htm

5. Conclusion

Urban rail systems require substantial infrastructure and large investments. They also require complex national integrated urban planning and implementation capacity.The case of Addis Ababa shows that a 100 percent renewables-based LRT system can be realized/implemented relatively in short period of time if government's commitment and allocation of public finance is ensured.

Supported by South-South cooperation which involved technical expertise, capacity building and investment support from China, combined with technology and knowledge exchange between the two partners, the Addis Ababa LRT project was constructed and became operational within a relatively short period of three years.

The project has made a good start, and offers social, economic and environmentally sustainable benefits, including: decreased air pollution by reducing particulate emissions; energy security by replacing fossil-fuels and saving expenditure; creating over 1,100 green jobs; and, providing affordable, inclusive and sustainable urban transport services to its citizens. In addition to supporting national development goals, the Addis Ababa LRT system has also helped to contribute to the country's NDC commitments. Another anticipated macro-economic benefit is the enhanced integration of Ethiopiawith its neighbouring African countries as well as enhanced access to sea ports.

To this end, Addis Ababa's experience can provide positive lessons for other cities in developing countries who are planning similar strategies for climate resilient and sustainable urbantransport options for their citizens.

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Mexico: Mexico City - from policy to action

Abstract:Mexico City has pioneered approaches to climate change, backed by the political support and leadership of its local mayor. This has enabled the city to address challenges related to decades of rapid urban and population growth which previously did not include climate considerations. Over the last 15 years, the city has taken progressive policy and legislative measures in response to climate change, and to address the 2030 Sustainable Development Goals.This includes the introduction of a comprehensive climate action programme, a city resilience strategy, and climate legislation. Mexico City has also introduced green bonds, the first Latin American city to do so.Taken together, these measuresare setting the city on a path towards becoming a low carbon and resilient city, as well as providing useful lessons to other cities in the Global South.

1. Context

Mexico City is one of the largest cities in the world, with a population of 9 million people. The city land area consists of 59% conservation areas which provides key ecological services, including groundwater recharge, but these areas are constantly threatened by informal urban growth.Population growth has remained stable while the urban surface area increased fourfold between 1970 and 2010, with a corresponding decrease in its density of population from 105 inhabitants to 65 inhabitants per hectare over the same period.

Mexico City

Population: 9 million (2015)

Land area: 1,485 square kilometres

GDP: 12% of GDP (Source: CDMEX, 2017).

Approximately 5.6 million people in the city are considered to be vulnerable to the effects of climate change (PACCM, 2014-2020). Mexico City's geographical location helps in understanding its environmental problems. The city suffers from air pollution because it is located at an altitude of 2,240 metres above the sea level, surrounded by mountains in a closed air basin; it is also prone to chronic flooding due to its proximity to the lowest part of the watershed. Other challenges relate to traffic, waste management, scarce water supply and lack of sustainable housing.

Urban mobility is yet another challenge. Private cars have dominated traffic circulating in the city during recent decades. Statistics for 2017 show that, out of a total of 17.3 million journeys in the city, 8.62 million were by public transport, 4.06 by private transport, 0.24 by bicycle, and 4.5 walking (INEGI, 2017;Secretariat of Mobility, 2019).Although the vast majority of vehicles in the city are private cars, they only represent 23.5 % of all journeys in the city. Most journeys are by public transport managed by private companies (67.8%), the underground (38.2%), taxis (11.2%), Metrobus (8.8%), and bicycles (4%) (INEGI, 2017; Secretariat of Mobility, 2019).

Mexico City's CO_2 equivalent emissions were 20.6 million tons in 2016, of which an estimated 95% were associated with fossil fuels. Transport was responsible for 60% of fossil fuel consumption (SEDEMA, 2018). Some 74% of greenhouse gas emissions are associated with mobile sources, while other significant sources are solid waste management and local industry.

2. City initiative

Mexico City has taken a number of progressive policy measures to tackle its climate change challenges over the last 15 years.The main climate policy commitments and action plans are articulated in its Climate Action Local Strategy 2014-2020 (ELAC) and the Climate Action Programme 2014-2020 (PACCM). The recent Resilience Strategy, published as part of the 100 Resilient Cities Initiative pioneered by the Rockefeller Foundation, further frames priorities in addressing the city's urban challenges.These include:planning for urban and regional resilience, promoting water resilience and management in the Mexico Basin, and improving mobility through an integrated, safe and sustainable system.

	Table 1:Summary of Key Policy Actions
2004	First climate change strategy created (Local Climate Action Strategy Mexico City), mainly mitigation measures, developed in collaboration with scientists from local universities.
2006	The first greenhouse gases inventory for Mexico City and its metropolitan area which is updated and published every two years
2008	First Climate Action Programme 2008-2012) developed as part of the city's Green Plan seeking to develop new transport, water, waste, land conservation and alternative energy programmes.68 mitigation measures listed,requiring significant new investment ($1 billion per year) in order to reduceMexico City's annual emissions by 12%.Limited adaptation measures identified.
2010	Inter-institutional Commission of Climate Change created, chaired by the Mayor. Charged with the design of climate change policies and the coordination, monitoring and evaluation of Mexico City's Climate Action Programme 2008-2012.
2011	Climate Change Law introduced(Ley de Mitigación y Adaptación al Cambio Climático y Desarrollo Sustentable para el Distrito Federal) providing a normative framework for climate measures – one of the first laws at city level in the world at that time.
2014	The new administration in Mexico City creates a first long-term strategy for climate change (Estrategia Local de Acción Climatica 2014-2020).
2014	Climate Action Programme 2014-2020, developed by a local think tank (Centro Mario Molina); balanced approach between mitigation and adaptation.
2014	Monitoring and evaluation system implemented for Mexico City's Climate Action Programme, and capacity building programme to create community climate change actions in the city's 16 administrative districts.
2014-15	A long-term vision (2025) of climate change measures in Mexico City is presented by the local government (La visión de la Ciudad de México en materia de cambio climático al 2025).
2016	Mexico City Resilience Strategy becomes part of the Rockefeller 100 Resilient Cities Initiative with short-term (2016-2018), medium-term (2016-2025), and long-term (2016-2040) measures.
2016	New building regulation with sustainability guidelines and sustainable buildings (developed in collaboration with the Danish Energy Agency).
2019	A new Mobility Strategic Plan is createdwhich gives priority to public transport over private transport, in order to reduce vehicular emissions.

3. Key achievements

Mexico City has successfully created a learning process which is helping to further build local mitigation and adaptation actions to address the challenges of climate change.Local authorities in Mexico City have recognized that responses to climate change are entwined with local development problems, but they still need to integrate the SDGs in these initiatives.However, as the city already had a well-established climate change agenda by the time the SDGs were incorporated in the local development agenda in 2016,significant measures are yet to be identified to integrate these two agendas have so far not gone beyond identifying potential synergies. Nevertheless, the city remains committed to the SDGs and has begun reporting on progress made on several of them (CDMEX, 2018).Furthermore, the current city administration has started work on a new Climate Action Programme for the 2020-2026 period that will integrate the SDGs.

Mexico City has taken several mitigation-related measures that are also oriented to deliver social and environmental benefits. CDMEX (2016) has estimated that Mexico City's mitigation efforts successfully reduced 7.7 million tons of CO_2 equivalent in four years (2008-2012) and it is expected that this will further reduce more than 10 million tons CO_2 equivalent between 2014 and 2020.

The city has strong local climate action plans and is an active participant in international forums to report on its commitments and actions. The city created its first greenhouse gas inventory in 2006, which acts as a baseline**.**Early mitigation measures have focused on critical and chronic urban problems in public transport and management of solid waste. Particularly relevant was the creation of a Bus Rapid Transit System (Metrobus) in 2005 and its progressive expansion in the following years, the expansion of the underground, expansion of the public bicycle-sharing programme (Ecobici) and adding cycle lanes in the city, the creation of "zero emissions" corridors with a fleet of electric trolleybuses, and the replacement of old polluting taxis with newer, more fuel-efficient models, including some electric cars. These measures have helped Mexico City to create an international image of a city committed to fight global warming.

Success in building responses to climate change is largely due to the political leadership of the municipality and its skill in linking local actions with international initiatives. Early steps to address climate change in Mexico City were initiated by the local Minister of Environment, a scientist convinced of the significance of climate change. Subsequently, the municipality recognized importance of mainstreaming climate change considerations at local level , particularly through public transport and solid waste management. There is scope for local universities, think tanks or NGOs to play a similar role.

Entwining the climate agenda with the local urban agenda has provided several benefits. Firstly, it has avoided imposing an additional workload on local planners and has avoided competition between the climate and the urban agenda for scarce resources. Secondly, the integrated approach has enhanced public support for climate change responses. These include the Metrobus system and expanding the underground network to solve the chronic mobility problems in the city, whilst at the same time forming part of the city's mitigation strategy. Finally, collaboration with the local universities and research institutions has been critical in developing strategies, programmes, plans and actions to address climate change. The city administration is developing a new Climate Action Programme 2020-2026 in collaboration with the local office of an international think tank. These collaborations have supplemented the skills of the local administration. It is worth noting that similar collaboration paths have been followed in other cities in developed and developing countries.

Mexico City can share lessons learned in the context of the science-policy interface through collaboration with universities and research institutions. Building successful collaboration requires creating a common space where scientific knowledge interacts with that of local practitioners to create a practical pool of know-how. This process faces significant challenges and Mexico City's experience could potentially be useful in city-to-city and South-South cooperation.

Institutional coordination mechanisms can help to accomplish agreat deal with relatively small investments in human and material resources. Mexico City has maintained a small climate change office during the last administrations. It also created an Inter-institutional Commission on Climate Change charged with coordinating climate change actions throughout local government. Retaining institutional memory within the local office has also been useful in identifying lessons andin using these lessons to navigate upcoming opportunities and constraints in developing a climate change agenda. The institutional dimension of climate change is one of the most challenging aspects of building sustainable urban development pathways. The experiences of the operation of Mexico City's Inter-institutional Commission of Climate Change provide lessons on what worked well and what worked less well. It can therefore serve to inform capacity-building programmes for urban officials in city-to-city and South-South collaboration initiatives.

The City Resilience Strategy (2016) was a turning point, as it provided a more balanced approach to tackling both adaptation and mitigation. The strategy has six priority areas:fostering regional coordination, promoting water resilience in the Valley of Mexico Water Basin, planning urban and territorial resilience, improving urban mobility through a secure, integrated and sustainable system, developing innovation and adaptive capacity. The strategy supplements Mexico City's Climate Action Programme in critical themes: an integrated perspective of water sustainability (flooding, landslides, and water stress), urban mobility, and enhancing climate change adaptive capacity. A resilience office was created within Mexico City's government as part of the City's resilience strategy. The office is responsible for coordination of the actors (public, private, social and the scientific community) participating in the strategy, its co-design and monitoring as a learning process. The scope of resilience in the strategy includes hydrometeorological and climatic events, but it also considers seismic impacts.

The review and monitoring of Mexico City's Climate Action Programmes is also a positive outcome of local climate change initiatives. An external review of the 2008-2012 programme by the Mario Molina Centre[48] provided key inputs to the design of the 2014-2020 programme.Consequently, some actions continued whilst others were discontinued or modified based on performance or lack of funding. The new programme added new measures, particularly in adaptation.It also carried out the city's first analysis of local social vulnerability to climate change, and strengthened mitigation measures initiated by the previous administration.

Monitoring and evaluation are critical elements of planning and implementing climate change measures, and lessons learned in Mexico City can be included in capacity-building programmes in the context of city-to-city and South-South collaborations.

Progressive policies and legislation created the impetus for innovative instruments: the first green bond valued at approx. 46 million EUR, was issued by Mexico City in December 2016, making it the first Latin American city to do so. This step was deemed important to enable the city to mobilize capital for climate-related urban investment.Proceeds from the bonds are intended to support eligible green projects in sustainable transport, renewable energy, energy efficiency, water

48 http://centromariomolina.org/english2/wp-content/uploads/2013/04/2b.-Assessment-on-Mexico-Citys-Climate-Action-Program-1.pdf

efficiency, wastewater management, pollution control, conservation of biodiversity and climate change adaptation.The bonds have exceeded expected demand in the market.

The Mexico City Government also created a Green Fund for Climate Change. The City'sGreen Plan – launched in 2007 and designed to help the city progress towards sustainable development – includes strategic actions to reduce traffic congestion and greenhouse gas emissions.The Green Planreceived financial support from the Clinton Global Initiative and the BRT Metrobus system was recognized as a Clean Development Mechanism (CDM) project activity. During the last administration in Mexico City, the city became part of the Green Bond Pledge, an international initiative seeking to have cities, public authorities and large corporations commit to increased use of green fund finance to ensure that new infrastructure meets the challenge of climate change, and is low carbon, adaptive and resilient. Mexico City's experience in creating funding opportunities for climate change actions can also be useful in capacity-building efforts in South-South collaboration.

The cost of inaction or delay in addressing climate change can limit development opportunities in the medium- and long-term. Due to the long lifespan of urban infrastructure (over 70 years), cities run the risk of lock-in, limiting the scope of mitigation and adaptation responses to climate change and increasing their cost (Ürge-Vorsatz et al., 2018).Large cities are particularly prone to this problem.Earlier integration of climate change in urban planning could have reduced the cost of mitigation and adaptation responses in Mexico City (Sánchez Rodríguez, 2010). Additional lessons learned in Mexico City that can potentially be helpful in South- South collaboration initiatives are the challenges, obstacles and limitations created by urban growth without climate considerations. These lessons could help other cities avoid lock-in situations limiting their opportunities to respond to climate change and reducing its potential cost. These lessons can be especially helpful for small and medium-size cities that have greater opportunities to integrate measures to create low carbon and climate resilient cities in their urban planning.

4. City-to-city partnerships / South-South and triangular cooperation

Mexico City has a dynamic and diverse international collaboration agenda in the context of climate change that has provided technical and financial support. The involvement of the following actors illustrates the diversity of these collaborations: Danish Energy Agency, Berlin Energy Agency (energy efficiency), German Corporation for International Collaboration (GIZ) (capacity building), French Agency for International Development (AFD) (capacity building and funding), US Department of Energy (information exchange), British Embassy in Mexico (funding low carbon projects and climate policies), Cooperation Fund Mexico-Chile, United States International Development Agency (USAID) (energy and water diagnosis in public buildings and saving opportunities), Carbon Disclosure Project (CDP) (international dissemination of mitigation efforts in Mexico City), Development Bank of Latin America (CAF) (funding for sustainable development and climate change projects), Inter-American Development Bank (IADB) (funding for sustainable development and climate change projects), Rockefeller Foundation- 100 Resilient Cities (Resilient Strategy), C40 Cities, World Resources Institute (WRI) (collaboration to Energy Efficient Buildings in Mexico City), Non-State Actor Zone for Climate Action (NAZCA) (four energy efficiency collaboration actions and seven CO_2 reduction commitments) (CDMEX, 2017).

Mexico City has also a strong presence in international cities organizations. Mexico City's mayor chaired the World Mayors Summit on Climate Change co-organized with ICLEI Local Governments for Sustainability in 2010 in Mexico City and mayors attending the congress signed the Mexico City Pact seeking a stronger voice for cities in global climate negotiations.The Pact calls for city leaders to propose binding targets for reducing carbon emissions and to publicly report their progress to the Carbon Cities Climate Registry launched at the summit and based in Bonn, Germany. Mexico City has been internationally recognized for its commitment to protect the global climate that has attracted international financial resources and support for further climate change actions. For example, the City was awarded the C40 Cities Award, 2017; won the Green Bond Pioneer Award, 2017 in the regional sub-sovereign category;and, in 2011, was awarded the local Climate Leadership Award for its local Climate Action Plan and its leadership on the Global Cities Covenant on Climate. City-to-city collaboration has begun to emerge in the context of these initiatives. For example, Paris and Mexico City created an initiative in the context of C40 to foster women's leadership in climate actions in 2018.Additionally, Mexico renewed its strategic agreement with C40 in September 2019.

Mexico City has a structure in place at municipal level for SSTC. Mexico City has an active role in international cooperation for development as recipient of financial and technical support from diverse sources, as illustrated in the above list. But Mexico City has also begun to become more active in mutual benefits projects. Although the experience of the city in this field has been limited up to now, two projects developed within the structure of South-South decentralized cooperation through the Mexico-Chile Joint Cooperation Fund onclimate change: one focusing on efficient use of water in Mexico City and Santiago de Chile Metropolitan area, the other fostering the use of public bicycles to mitigate climate change in Mexico City and in Santiago de Chile (AMEXCID-PNUD, 2017).A city-to-city bilateral cooperation project of between Mexico and France on urban challenges and innovation in Mexico City and Paris is also an encouraging precedent. The two projects, carried out by the Metropolitan Government of Santiago de Chile and Mexico City's Environment Department, are an encouraging precedent for future SSC in Latin America, particularly through the Latin American Network of Local Authorities, but also with Africa and Asia.

In 2019, Mexico City signed memorandums of understanding with local authorities, with California, for example, (climate change, air quality, etc.) as well as triangular cooperation schemes with other cities.The MoU with Medellín, Colombia on air quality is the first instance where Mexico City is the sole provider of technical cooperation to another city.

5. Conclusion

The experiences of Mexico City illustrate the challenges and opportunities in building local responses to climate change. The city has created a dynamic and comprehensive programme including a supporting normative framework.Mexico City's climate change responses have been a learning process, with successful precedents being set that is likely to encourage further progression towards integrating the climate change and urbanisation agendas.

Key progressive components of this process are a local climate change law, a climate change strategy with long-term goals, several interactions of climate action programmes with mitigation and adaptation actions, and a Climate Change Fund. Part of the success of Mexico City is due to the political leadership of the local authorities, but also to the collaboration with local universities, think tanks, institutions, international climate change initiatives, and international development agencies.

The lessons from Mexico City show several potential benefits to be shared in city-to-city partnerships, as well as in SSTC. These lessons can accelerate the generation of responses to climate change and achievement of the SDGs in cities of the Global South, especially in the case of small and medium-size cities. Timely action can help cities to gear up to the challenges of the future.

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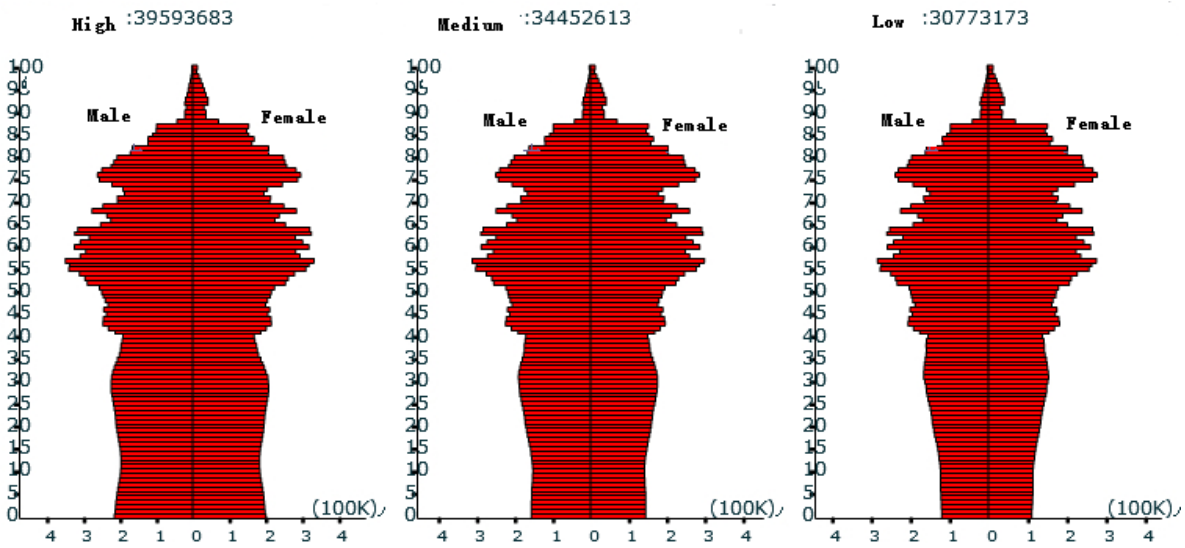
UNFPA, PADIS-INT - Population projection for urban planning

Abstract: As populations become increasingly urbanized, including through migration, authorities will need to take account of current and future demographics into policies, infrastructure and delivery of basic services for their citizens. Population projections and analysis can usefully inform policymakers of emerging trends and predict future needs for urban services such as water, food, energy and transport.However, reliable and timely data is not always easily available. The China Population and Development Research Centre (CPDRC), with support from the United Nations Population Division, introduced an innovative web-based population projection software program - PADIS-INT. The successful implementation of the tool in China has led to requests from other developing countries for PADIS-INT through the modality of SSC.



Three scenarios population pyramid of Chongqing in the year of 2050

Graph provided by Chongqing Demographic Information (Training) Centre, 2019

1. Context

Demographics matter, as cities continue to change and grow overtime. People are at the heart of social development and growth. Therefore, population-related policies and decisions are likely to have long-term impacts on economic and social well-being.

By 2050, the global urban population is projected to rise to 68% (UN, 2018).

The size of the population, its characteristics and distribution are essential factors that need to be taken into consideration by urban planners for sustainable development and for adaptation to climate change. Having a robust understanding of current and future population growth and trends can help city authorities to adequately plan for basic services, infrastructure development, land use and spatial planning, affordable housing, and other resource requirements. Furthermore, population densities in urban areas can both affect and be impacted by environmental and climate change. Understanding which segments of the population are likely to be more vulnerable to temperature increases or extreme weather events - for instance, the elderly population – can help local authorities to take timely action. However, in the absence of scientific data and local capacity,

anticipating future population numbers and characteristics remain challenging, and urban planners are left to rely on estimates and assumptions.

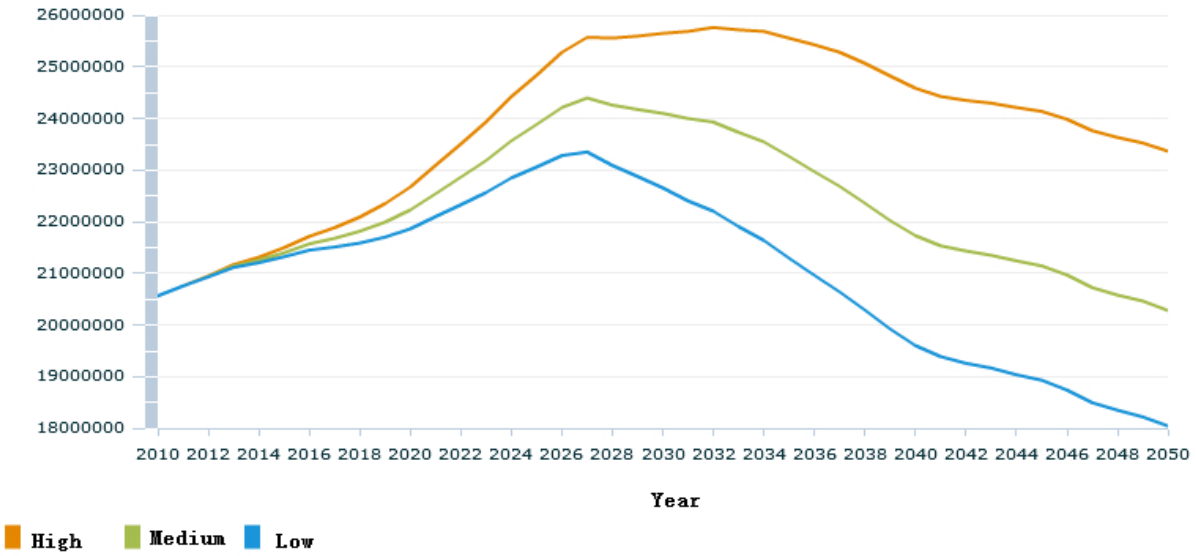
China's lack of an official population projection and forecasting system was felt to constrain decision-making related to urban planning, population policy and public services (Xuying et al., 2019). For instance, Chongqing Municipality is the largest municipality directly under the Central Government of China, with a population of 31 million (2018).Located in the less developed western part of China, Chongqing has been among the provinces/municipalities in China most affected by migration, both incoming and outgoing. Chongqing built a demographic information database covering the whole municipality, as there was a clear need to better understand future local population trends.

The PADIS-INT tool, named after the Population Administration Decision Information System (PADIS), wasestablished by China in 2011. The PADIS-INT population projection application was piloted in Chongqing Municipality, with UNFPA support. The funding for the application and promotion of PADIS-INT included:UNFPA Office in China (20%), China Population Development and Research Centre (CPDRC) (40% + technical support) and Chongqing Municipal Government (40%).

2. Urban initiative

PADIS-INT was developed and used to perform multi-scenario projections of the demographic trends of Chongqing Municipality and its districts/counties in 2010-2050, using multiple parameters of fertility, mortality and migration. It also analysed the characteristics of future demographic trends in the respective districts/counties of Chongqing, their impact on the economy and society and proposed targeted coping strategies. The project team has continued to improve PADIS-INT, developing the district-specific population migration projection method to make the results of small/multi-area population projection more realistic and relevant to Chongqing.

A key feature of PADIS-INT is its applicability to smaller geographical areas and at subnational level. Projections in smaller concentrated geographical areas (e.g., cities) are usually more challenging, due to a larger margin of error from unforeseen factors, such as migration, that can have significant implications for the projected results. This sets PADIS-INT apart from other population projection software that is usually valid for larger populationsat national level.The application is open source, and enables the input of a range of demographic parameters, such as base-year population, total fertility rate, fertility age patterns, model life tables, life expectancy at birth, migration rates etc.The resultant population projections offer strong visualization and can be used by professional researchers, government planners and business marketing developers.



The trend in the working-age population in Chongqing (unit: person).*Graph provided by Chongqing Demographic Information (Training) Centre, 2019).*

Capacity-building and technical assistance on PADIS-INT has helped to guide municipal officials in using the software. Since 2012, set up jointly with the support of UNFPA, CPDRC, Peking University and Renmin University of China,a PADIS-INT application project team has been providing training on PADIS-INT and its application in population and development planning. This has benefited more than 300 government staff at municipal, district and county levels in Chongqing. The project team provided technical assistance to Chongqing on the use of PADIS-INT, help in analysing the results of population projections and summarizing successful experiences, especially to guide the conduct of small-area population projections in all 39 districts and counties of Chongqing.

Population projection results and data meet current standards and are in use. In 2015, UNFPA organized international experts to review the PADIS-INT software, and all concluded that "PADIS-INT has met the standards of mainstream international population projection solutions and boasts relatively higher projection accuracy". The PADIS-INT applications and results have been embodied in the book titled *Multi-Scenario Population Projection of Chongqing Municipality and Its Districts,* published by China Population Press. China has, for the first time, published multi-regional population projection results and data sets. Professor Jiang Zhenghua, a famous Chinese mathematical demographer, personally prefaced the book, which was also awarded the First Prize in the "China Population Science Outstanding Achievement Award (for Monographs)". The award was also reported by multiple media in Chongqing and received positive social responses.

3. Key achievements

PADIS-INT has drawn international attention and praise. The application has been featured in several international events, including the27th and 28th International Population Conferences of the International Union for the Scientific Study of Population (IUSSP), the 47th Session of the United Nations Commission on Population and Development, and the UN Conference on Sustainable Development held in Brazil in 2012.It has attracted the attention of internationally renowned demographers and experts who have highly praised Chonqing's remarkable achievements in the dynamic analysis and applications of population data.

The results of PADIS-INT projections have been successfully applied in the policymaking of Chongqing and its districts/counties, significantly contributing to its urban planning and public services – particularly, health and education.

PADIS-INT provides basic data support for urban planning. In compiling the "13th Five-Year Plan of Chongqing Municipality (2016-2020)", the Chongqing Municipal Development and Reform Commission specifically took into account and adopted the population projection results obtained from PADIS-INT. Data obtained from PADIS-INT also provided strong support for the formulation of the "13th Five-Year Plan of Chongqing Municipality for Medical and Health Undertakings" and provided decision-making support for the formulation of the *Code for the Planning of Educational Facilities* by Fuling District Government of Chongqing. The data generated by PADIS-INT are cited repeatedly in the *Research on the Population and Urbanization Development Strategy of Chongqing*,published in 2013.

The tool also provided decision-making support to the local government in setting up five functional zones. In September 2013, Chongqing Municipal Government took the key decision to set up five functional zones in Chongqing, which included the Core Municipal Functional Zone, the Extended Municipal Functional Zone, the New City Development Zone, the North-eastern Chongqing Ecological Nourishing Zone and the South-eastern Chongqing Ecological Protection Zone. The classification of these functional zones took into account factors such as natural environment, the socioeconomic development, the characteristics of the ecosystem and the different types of human activity, which helped to promote coordinated development across the zones and a rational distribution of population and the economy so as to achieve sustainable development. This decision was based on the data and analysis report generated by PADIS-INT.

Five functional zones of Chongqing (2013)

Graph provided by Chongqing Health Commission,2019

Early warnings helped local authorities to anticipate and provide for peaks in primary school enrolments. While household data from the public security system had projected the peak year of primary school enrolments as 2016, the PADIS-INT data showed that enrolments would instead peak in 2013. This early warning prompted the Fuling District Government to undertake successful coping actions to ensure the full enrolment of all school-age children within the district, thereby delivering significant social and economic benefits.

Policy simulations by PADIS-INT helped to adjust fertility policy in Chongqing. In 2012-2016, PADIS-INT was used to simulate the impact of a "Selective Two-Child Policy" and a "Universal Two-Child Policy" on the demographic trend of Chongqing, based on different fertility levels. The projection results were adopted by the Standing Committee of the Chongqing Municipal People's Congress.

PADIS-INT expanded the application of Chongqing's population data to the health field. The successful application of the PADIS-INT projected data has attracted the attention of the relevant authorities of Chongqing Municipal Government. Since 2017, UNFPA has continued

to fund the application of population data in the Internet+ health and medical services in Qijiang District and Nan'an District of Chongqing and to support the establishment of electronic health records for residents, thereby gradually shaping a PADIS-INT powered model, integrating population data collection, convergence, linkage and big data application.

A pilot on extended applications of population data to big data has been successful. With the support of UNFPA, the application of PADIS-INT has been extended to the field of big data. Two pilot areas of Chongqing's Qijiang District and Nan'an District have integrated the data on population, health and medical resources to help the government, families and individuals in controlling the rise of medical expenses.The collection, analysis and application of health-related big data helped to address issues related to access to and costs of medical treatment. The successful pilot has provided the basis for upscaling the integration of population and health data at the municipal level of Chongqing.

4. City-to-city partnerships / South-South and triangular cooperation

Several developing countries have expressed strong interest in the PADIS-INT application. China has responded with a package of training, capacity-building, studyvisits and technical assistance.

Population and Development South-South Cooperation Centre of Excellence (PDSSC): On the basis of the successful application and promotion of PADIS-INT, in May 2017, UNFPA and the China National Health Commission jointly launched the "Population and Development South-South Cooperation Centre of Excellence (PDSSC)", hosted by CPDRC. The Centre of Excellence is committed to providing developing countries with technical and capacity-building support relating to population data and population projection, thus serving as a platform for sharing of experiences. In addition to organizing an annual population data training workshop for developing countries, PDSSC also organizes the annual "China-Africa Conference on Population and Development" and the "Asian Conference on Population and Development".

So far, three China-Africa Conferences on Population and Development have been held. The first was held in Nairobi,Kenya in 2017, focusing on harnessing the demographic dividend in Africa. It attracted the participation of more than 100 participants from 13 countries; the second conference was organized in Guangzhou, China in 2018, focusing on SSC and achievement of the demographic dividend in Africa; and the third conference was held in 2019 in Accra, Ghana, on the theme of "Population data management and universal access to reproductive health as key drivers of sustainable development", attracting over 300 participants. At each of these conferences, an outcome document was produced, containing the consensus reached at the conference and recommendations for future activities. As the first China-Africa dialogue mechanism on population and development, it provides an important platform for routine exchanges between China and the African continent.

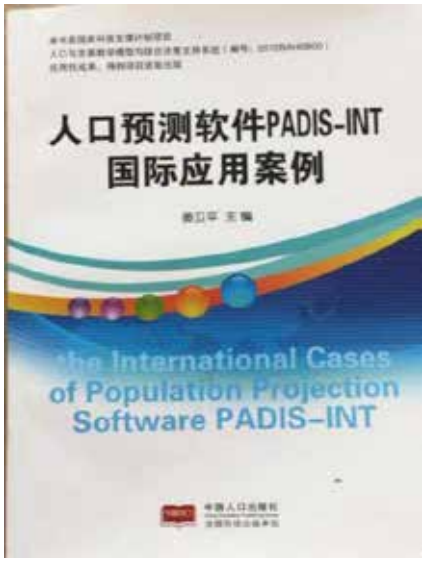
The Second China-Africa Conference on Population and Development, 8-10 July, 2018, Guangzhou, China

Picture provided by CPDRC, 2019

Several training events have also been held. In order to strengthen developing countries in terms of population data collection and capacity-building, PDSSC, CPDRC and the United Nations Population Fund have jointly held an annual "Training workshop on population data collection and population projection". Since 2018, the workshop has been held in Beijing and Nanjing respectively, with over 20 participants from 17 countries in 2018 and 13 participants from 7 countries in 2019. Based on the needs of developing countries, the workshop provides academic training on a range of topics such as population census, sampling, data management, population projection methodology and projection software (PADIS-INT), and social survey platform applications to assist developing countries in improving their own population data systems. Since 2012, China has been incorporating PADIS-INT and its applications as a core training component into its population data training workshops for developing countries. So far, more than 200 trainees from over 20 countries have received such training.

Knowledge exchange is being supported. With UNFPA support, CPDRC is rolling out annual capacity development and knowledge exchange on PADIS-INT and its applications for African countries, benefiting more than 100 trainees.This includes the following:

- Kenya's Vision 2030 authority sent two population experts and officials to CPDRC to attend the first international training on PADIS-INT in 2011.Kenya has subsequently used the software to undertake population projections for its provinces and found it to be efficient, economical and affordable.
- In response to a request by the National Population Council of Ghana, a special training seminar was conducted for its technical officials to help build its capacity in population projection in 2014. Two experts from the Ghana National Population Council visited CPDRC to attend PADIS-INT training
- Before that, in 2012, the Turkish Statistical Institute also sent experts to CPDRC to attend PADIS-INT training and application research, and later applied PADIS-INT in the official projection of Turkish population and the release of demographic information. The results of these projection exercises have been included in a publication called "The International Cases of Population Projection Software PADIS-INT".



The International Cases of Population Projection Software -PADIS-INT (cover page)

Picture provided by CPDRC, 2019

- Over recent years, population officials or scholars from Brazil, Burundi, Viet nam, India, Iraq, Singapore, South Korea and North Korea have successively visited CPDRC to observe the applications of PADIS-INT. They have subsequently requested that PADIS-INT be included in the scope of SSC between China and their countries.

5. Conclusion

China's Population and Development Research Centre (CPDRC), with UNFPA support, has successfully demonstrated the practical application of PADIS-INT in generating population

projection insights to assist Chongqing Municipality with its development planning. The successful implementation of Chongqing case has provided strong data support for government policymaking concerning population urbanization, population policy, urban planning and public resources allocation. The integration and application of health-related big data has allowed accurate and effective control of rising medical costs incurred by government, families and individuals.

PADIS-INT also serves as a stellar example of South-South cooperation. The model is replicable and provides tremendous scope for other cities to use population projection applications in their own planning and development.PADIS-INT is a tool that offers potential for cities in projecting and analysing their population demographics.China's South-South Cooperation Centre of Excellence continues to offer PADIS-INT training and technical services for countries or cities planning to carry out population projections.

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FAO, Food and the city: Dakar's micro-gardens and its partnership with Praia and Douala

Urbanization affects every aspect of our food systems, from the way food is produced, to the way it is processed, packaged, transported, marketed and consumed, to how food waste is handled and recycled. (FAO, 2018)

Abstract:Cities are rethinking their approach to food systems, so that their citizens can benefit from food security and nutrition. The Food and Agriculture Organization (FAO) – a specialized agency of the United Nations - played a facilitative role in enabling the city of Dakar (Senegal) to develop its micro-gardening projectfor which the city was awarded the Dubai International Award for best practice in 2008, and to share its experience on micro-gardens with the cities of Douala (Cameroon) and Praia (Cabo Verde). Since then, pilot South-South cooperation projects in Douala and Praia have not only helped to raise awareness of the importance of urban food policies to develop resilient, inclusive and sustainable food systems, but have also increased the capacity of these partner cities in micro-gardening techniques.

Photo:Micro-garden project in Dakar, credit: Cristina Alderighi, FAO , 2017

1. Context

Cities need to find innovative solutions to their food systems – so that their rising urban populations have access to healthy, nutritious diets. In Africa, the UN estimates that the rate of urbanization will continue to grow to 56 percent by 2050, with an urban population of 1.34 billion people. Climate change is already affecting food production and its impacts are likely to be greater in future years. Rising temperatures, changing seasonal weather patterns, rising sea levels and water scarcity are impacting agricultural productivity. Unsustainable production and consumption practices and environmental degradation, including soil and water pollution, are putting further pressures on food systems.

Access to affordable, nutritious and balanced food – such as fresh vegetables - is not easy for poor city dwellers. One approach to make nutritious food in the city contextavailable for the poorest is for them to produce part of it, especially vegetables, which can complement their intake of food grains.

The city of Dakar (Senegal), located on the West African coast, faces similar challenges, and was thus taken up under the FAO project. The wider Metropolitan Area of Dakar has a large urban population of over 3.7 million people (Senegal National Agency of Statistics and Demographics, 2011),representing over 20% of the country's population.With the expansion of the city and its urban population, there is limited space for agricultural activities, and the city has a high population density, thus posing challenges of food security.

2. City initiative

As part of its South-South cooperation programme, FAO launched a city-to-city cooperation mechanism aimed at empowering local government to enhance food security and nutrition in urban areas, as well as supporting cities in the South to share and promote good practices to strengthen urban food systems. The first pilot initiative, implemented in partnership with the Municipality of Dakar and local governments of other African cities, focused on micro-gardens.

Micro-gardening is a soil-less farming technique that is inexpensive and relatively easy to implement. Vegetables are grown in small containers, filled with a planting substrate.The technique allows households to grow a wide variety of vegetables using small patches of vacant space across the city with adequate sunlight and water supply – such as rooftops, terraces and courtyards.

Micro-gardening has three immediate benefits:firstly, by growing their vegetables at home, households have immediate access to a fresh, healthy diet that is rich in nutrients; secondly, households can supplement their income by selling surplus produce in local markets, and, finally; it enables the active engagement and empowerment of socially vulnerable communities, including women, elderly and vulnerable households.

Dakar initially started its micro-gardens project in 1999, drawing on the experience of Colombia. Early phases focused on reducing poverty through the production of nutritious food and income from selling surplus crops. FAO supported a second phase which expanded the focus of the programme to include participatory approaches with citizens, a diversification of the produce and enhanced commercial activity, and capacity-building of city government authorities. In a subsequent, final, phase, the financing was provided by the city of Milan and the Italian Ministry of Foreign Affairs, while FAO provided technical support.

At the start of the programme, agriculturists within the Ministry of Agriculture received training to familiarize them with new techniques. These technicians subsequently acted as trainers to project beneficiaries, who were selected on the basis of their poverty levels, and motivation to participate in the project.

Women mostly enrolled in the programme, particularly those with limited access to farmland or alternative sources of income. Whilst the project paid for the training, it also invested in workshops for regional technicians from across the country, and that has helped to transfer the model to other regional cities in Senegal, as well as supporting research to improve techniques, lower production costs and improve marketing.

3. Key achievements

The programme in Dakar was very successful and, in 2008, the project won the Dubai Award given by the Municipality of Dubai for best practice projects in horticulture.

More than 4,000 families were trained, and the programme was targeted to benefit vulnerable groups, such as people with disabilities, the elderly, orphans, and those with ill-health. Micro-garden units were also established in 27 primary schools for educational purposes, in support of nutritional and environmental awareness and education.

Project results estimated that participating households were able to produce at home, diversify their diets, and consume more than double the vegetables compared to non-participating households. As micro-gardens are able to produce 6 cropping cycles per year, on average, the participating households were able to produce 30 kg of vegetables per square metre, per year.Furthermore, the sale of surplus produce helped to supplement family incomes, improving their livelihood.

The results from Dakar show that 80% of beneficiaries are women, and 50% of beneficiaries are young people under the age of 36 years. The success of micro-gardens in Senegal is greatly enhanced by the involvement of women in the process. In the context of Dakar, the socio-cultural aspects contribute to the empowerment of women about their roles and responsibilities. The centres are meeting places for women, men and young people, for socializing, businessand marketing of micro-garden products.

As part of its capacity-building and sustainability measures, the programme also helped to establish a new administrative unit within the Dakar Municipality Department of Urban Development in charge of micro-gardening.Additionally, the programme also set up 134 community production centres with water access and 12 training and demonstration centres around the city of Dakar. Approximately 24 trainers were trained in micro-garden technologies, compost and vermicompost production, and in the organization of the sector which has helped to build local capacity to sustain and upscale these efforts country-wide. Lastly, the programme was included in the socioeconomic development plan of the City of Dakar.

The programme was able to use sustainable and environmentally-friendly techniques. Recyclable material, such as cardboard boxes, buckets or tyres, was used to make containers for micro-gardens; while agricultural or other organic waste, such as groundnut shells or rice husks were promoted as substrate to fill these containers. The technique was therefore seen as low cost, environmentally friendly and easy to use. By using materials that were locally available and experimenting with different

techniques, the programme helped to improve access and uptake by local users.

The FAO-supported programme was strongly aligned with the New Urban Agenda, which promotes the engagement of local authorities.The project partnered with local institutions across various levels of government, non-governmental organizations (NGOs), and private actors in a participatory approach, and also helped to establish broader networks.

4. City-to-city partnerships / South-South and triangular cooperation

The success of the project in Dakar enabled its replication across other African cities. The project also supported the development of a manual to capture experiences and technological insights to facilitate transfer of the micro-garden programme to other cities.

Knowledge Product on city-to-city micro-gardens. Source: FAO (2018)

City to City cooperation, especially through SSTC, is an important way to disseminate knowledge, where one city context can readily relate to another. FAO plays a leading role as a facilitator, helping to connect one city with specific requirements with other cities that offered solutions. By sharing successful practices, cities can quickly adopt and adapt them to their own contexts and make huge strides towards their own food goals.

FAO and the city of Dakar signed a Memorandum of Understanding to enable the city of Dakar to share its knowledge and experience of micro-gardens with two African cities: Douala (Cameroon) and Praia (Cabo Verde). The City-to-City project integrated horticulture production techniques with environmentally-friendly technologies suited to cities, such as household waste recycling for compost and rainwater harvesting for irrigation. In addition, it contributed to waste reduction, as suitable containers were recycled and reutilized for micro-gardening purposes.

The main objectives of the exchanges among cities were to enhance thecapacity of representatives of Douala and Praia on micro-gardening techniques,provide technical assistance to both cities in implementing micro-garden projects at local level and raise awareness of the importance of establishing a framework to facilitate the adoption ofurban food policies at local level.FAO facilitated a range of activities which included: training of trainers from the two cities (Douala and Praia) in micro-garden techniques; pilot projects and demonstrations at field level in each of the three partner cities; exchange of technical expertise and good practice, capacity-building, policy discussions through workshops, and sensitization on sustainable urban food policies and sustainable food systems.

Through training, thanks to the Dakar experience, technicians within both city partners disseminated this technique and were able to start implementing this new way of producing food in their cities. Technicians and city representatives, five each from Douala and Praia respectively, benefited from capacity-building and train the trainer sessions in the city of Dakar.Joint training sessions were particularly helpful, and included sessions on micro-gardening techniques, such as crop calendar management, substrate preparation, nutrient solution preparation and use, composting (including vermicomposting), sowing techniques, fertilization, pest management and biological

insecticide preparation, irrigation, aquaculture and plant protection. The opportunity to participate in theory classes, combined with practical demonstrations, enabled participants to exchange information on sustainable food systems and ongoing practices in their respective cities. Senegalese horticulture experts, in turn, visited the other two cities to provide technical expertise and to showcase the benefits of micro-gardens in improving food security and nutrition by setting up two demonstration centres in each of the municipalities. Specific train the trainer sessions were organized, beneficiaries were identified, and awareness-raising sessions for local communities were held.

Efforts under the city-to-city initiative have also helped to sensitize stakeholders and raise interest among local governments in food security and nutrition. The City of Dakar also organized awareness-raising workshops, focused on urban food policies and sustainable food systems, which were well attended by participants from other cities in Senegal and elsewhere in West Africa, including Douala, Praia, Niamey, Banjul and Ouagadougou. In addition, specific round tables enabled participants to discuss technical issues, economic models for the management of micro-gardens without external funding, and issues related to land tenure. Participants were also able to exchange information and learn from each other's experiences and make specific recommendations for city-to-city cooperation mechanisms to develop sustainable food systems.

The local authorities in Praia inaugurated a micro-garden demonstration centre.This centre provided training for both individuals and technicians from other municipalities, raised families' awareness of how to improve and enrich their diet by using home-grown produce. Local authorities also used social media to actively promote the technique more widely. Thanks to the demonstration and training centre, several social institutions were rapidly supplied with fresh vegetables (e.g., residence for elderly people and children, social rehabilitation centres, Cabo Verde Institute for Youth, and Cabo Verde Red Cross).

To cope with the unsatisfactory agricultural year, the City of Praia, together with the NGO City Habitat, supported the introduction of micro-gardens in other cities of Santiago Island. Training sessions for women, young jobseekers and heads of household were organized in severalsuburbs of Ribeira Grande City. More specifically,80 people were trainedin June 2019, some of whom have started their own production, resulting in an increase in income. Main crops produced included, lettuce, beetroot, radish, spinach, sweet potato, tomato, parsley, cauliflower, mint and tea. New micro-garden units are planned all over the Cabo Verde archipelago, in communities and schools, and bio-composting will also be developed and promoted at national level.

The city of Douala presentedthe project during a two-day exhibition "Feeding Douala, a community involvement" which was organized around World Food Day. Thanks to this exchange, Douala built a demonstration and training centre and set asidea 300 square metre experimental site at the municipal premises to test new crops and substrate types.Main crops currently grown are lettuce and mint, which have a short agricultural cycle.

Similar to Praia's approach, this project had a deep social component,as several awareness raising events were organized with local NGOs or associations ("Dream Douala","Makepe Missoke") addressed to most vulnerable communities.

In addition, the city took another path, seeking to establish an overall urban food strategy. The mayor requested FAO's assistance in developing the food strategy and its action plan, which led to the signing of a Letter of Agreement in December 2017. This initiative includes a rapid assessment of the city's food system; the implementation of a multi-stakeholder platform on the integration of

food systems in urban planning; capacity development activities on food systems and the promotion of further exchanges with the city of Nairobi (Kenya), which benefited from the FAO-supported NADHALI project in Nairobi (Kenya), Dhaka (Bangladesh), and Lima (Peru) on support for food systems planning.

A key factor for success was ownership at political, institutional and structural level with the establishment of dedicated units at the municipal level, to maximize the benefits of the SSC exchange.

5. Conclusion

Climate change is threatening the ability of countries to feed burgeoning world populations, and African cities are at risk. There is growing recognition that local and regional governments have the potential to become change agents in improving food security and nutrition, while fostering inclusive development.

Supported by FAO, the city of Dakar's experience with micro-gardening techniques has successfully demonstrated an approach that is self-sustaining and economical, while helping to improve the nutritional status of families and enable them to generate additional income. Compared to conventional techniques that need more land and water resources, micro-gardening requires very little in the way of resources and can therefore be easily implemented with minimal effort. This approach is being replicated across other cities in Senegal. Furthermore, city-to-city cooperation facilitated by FAO has enabled the cities of Douala and Praia to benefit from Dakar's experience and take up micro-gardening projects.The experience has also enabled FAO to fine tune its approach to SSC at local level, as it drives forward its approach of promoting greener cities more widely.

Within the city-to-city initiative, in addition to facilitating exchanges at local level, FAO organizes dedicated policy dialogues for local decision makers in which cities can exchange ideas and experience on specific issues related to governance, nutrition, social and economic equity, food production, food supply and distribution as well as food waste.

Several international forums are helping to champion sustainable food systems in cities through SSTC. The Milan Urban Food Policy Pact (MUFPP), which has expanded to include over 207 cities as signatories, is facilitating exchanges and advocating for the role of cities in taking adaptive measures to develop their food systems in the context ofclimate change.More recently, in October 2019, the C40 Good Food Cities Declaration secured the commitment of 14 cities to sustainable and inclusive urban food policies to improve public health and reduce food waste.

Looking ahead, contemporary solutions are required to tackle urban food security and nutrition. Developing innovations, adapting them to suit local contexts, engaging with cities and their citizens in order to operationalize them, and finding suitable financing mechanisms to support these processes will enable a transition to nutritious, affordable and accessible urban food systems.

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Chile, Santiago:Climate change challenges and governance

Abstract: Dense urban areas like Santiago are affected by climate change and at the same time give rise to emissions that contribute to the problem. The Metropolitan Region of Santiago, like the rest of central and southern Chile, is suffering from a megadrought. Moreover, despite substantial improvement over the last three decades, air quality remains a pressing problem, albeit with a more elusive oxidative character that cannot be solved solely based on technological measures. The urgency of the issues at hand and the much-needed search for resilience building in Santiago trigger win-win opportunities for sustainable development, which will require much improved and articulated urban governance.This case study offers a research perspective on the resilience-building policy measures that the city of Santiago is putting in place.It asserts that evidence-based decision making will become paramount, requiring a much tighter connection with science, the generation of high-quality information for assessing climate vulnerability, as well as much stronger citizen participation.

1. Context

Chile has high rates of urbanization and GDP growth, but also suffers from pervasive and high levels of inequality. Chile's urbanization rate, estimated at 90% (INE 2017), is higher than the Latin American and Caribbean (LAC) region average, which itself is the world's most urbanized region (UN-Habitat, 2012). Chile's Gini coefficient of 0.46 in 2017 makes it one of the most unequal countries in a region characterized by inequity (OECD, 2015: Solimano and Schaper, 2015; UNDP, 2017).[49]

Santiago
Population: 7 million (OECD, 2013)
Agency: Regional Climate Change Committees, CORECC

The Metropolitan Region of Santiago, one of Chile's 16 administrative regions, is experiencing rapid urban sprawl, particularly towards the south and southeast (Gallardo et al., 2018) urbanization constitutes a major and growing driver of global change and a distinctive feature of the Anthropocene. Thus, urban development paths present opportunities for technological and societal transformations towards energy efficiency and decarbonization, with benefits for both greenhouse gas (GHG. The city has experienced a marked territorial expansion, from 522 km^2 in 1986 to 776 km^2 in 2016. According to Central Bank statistics,[50] Santiago accounts for nearly half of the country's gross domestic product (GDP) yet, like the rest of Chile, it is characterized by widespread inequality.

Climate change is having a significant impact in Chile, including through warming. Earlier climate impact assessments for Chile and Santiago showed clear signs of drying and warming over central and southern Chile(CONAMA, 2006; McPhee et al., 2014). This has now turned into a decade-long mega drought which is largely attributable to anthropogenic forcing, albeit modulated on annual to decadal time scales by natural variability (Boisier et al., 2016; Garreaud et al., 2017; Boisier et al., 2018).In addition to direct impacts on water availability, the drought has resulted in multiple impacts affecting vegetation, coastal marine biogeochemistry, and the intensity of forest fires, highlighting mutually dependent effects of the drought on Chile's socio-ecological systems (Garreaud et al., 2017). These stresses are further amplified by inadequate water governance in Chile, e.g.,(Barría et al., 2019), which will need innovative, and participatory adaptation strategies (Barton et al., 2015; Meza et al., 2015).

Several studies have shown an urban heat island effect of approximately 5°C in the

49 Gini coefficient is a statistical measure of economic inequality of a country's population, ranging from 0 (perfect equality) to 1 (perfect inequality).
50 https://www.bcentral.cl/pib-regional

summer(Sarricolea and Martin-Vide, 2014; Smith and Romero, 2016; Sarricolea and Mesguer-Ruiz, 2019). This effect is closely related to the distribution of vegetation in the city, yet another indicator of inequity in Santiago.As the city continues to grow under a drying and warming climate, the heat island effect is likely to increase.

Air quality has also significantly deteriorated, alongside an increase in urban mobility.A recent review of the evolution of air quality over the past 30 years, and its strong coupling with urban mobility, has shown evidence of a substantial decrease in coarse aerosol (PM10) concentrations in Santiago, despite urbanization and motorization rates (Gallardo et al., 2018).The review noted a dramatic decrease in public transport use in Santiago, falling from 83% in 1977 to 47% in 2012, with a corresponding increase in private car use.These developments reflect the success of the mainly technological and operational policy measures adopted since the early 1990s. However, these efforts have been counteracted, in the case of fine mode particles (PM2.5), by an increase in vehicular activity levels (Barraza et al., 2017). Likewise, a transition to a more oxidative atmosphere, where secondary aerosol formation and photochemical pollution become particularly relevant, is suggested. The need to face poor air quality also offers an opportunity for simultaneously mitigating air pollution and climate forcers.

Chile has a National Policy for Urban Development (MINVU and UNDP, 2014), but lacks an integrated urban and territorial governance policy.There are a myriad of policy instruments and legislation that depend on multiple authorities over a range of hierarchical levels (Precht et al., 2016). The lack of integrated urban governance hampers the efficiency of policies and plans aiming at urban sustainable development.

Political administration in Chile is highly centralized and divided at subnational level into regions, provinces and municipalities. As such, the Metropolitan Region of Santiago lacks an integrated public institutional structure, which impacts on the coordination of public policies (Gore, 2017). Land use, housing, public transport and environmental policies are designed and implemented independently of each another (OECD, 2013), and local institutions and authorities lack the political autonomy and resources to govern the Metropolitan Area of Santiago as a whole. Furthermore, some institutional weaknesses in the transparency of decision-making processes and opportunities for public participation have been identified (Hölzl and Nuissl, 2014). These issues are being addressed in part by new legislation (Act 21074)),[51] which involves a gradual transfer of responsibilities and functions from the national to the regional level, including the creation of 'urban areas', with improved policy instruments for governance and planning.

At national level, the Ministry of Environment has recently submitted a draft Framework Climate Change Act for public consultation, which will subsequently be subject to parliamentary discussion. The consultation process is a part of Chile's environmental legislationprocess and is expected to gather different points of view involving multiple stakeholders in the decision making. However, the consultation process and citizen participation are subject to criticism, and Chile has been characterized as a country with low public participation and citizen engagement. This stems partly from the unresolved legacy of the transition to democracy, the disconnect between citizens and public authorities, and lack of confidence in public authorities and the Government (OECD, 2017). So far, the law establishes a goal of low carbon development and carbon neutrality by 2050, and aims at climate resilience, but it makes no explicit mention of urban development.

51 http://bcn.cl/23seb

A National Climate Change Action Plan (PANCC) acts as the overarching framework for climate change. The PANCC was launched by the National Commission for the Environment (Ministry of Environment since 2010) for the period 2008-2012 and was recognized as the first Chilean policy instrument to be developed in direct response to climate change (CONAMA, 2008). In the absence of a climate change law, the PANCC is the highest-level instrument to address climate change and provides a coherent institutional structure to coordinate all actions in the public sector at national and subnational level.

The updated PANCC (2017-2022)seeks to establish, in the short term, a new crosscutting and integrated vision for adaptation, mitigation, and capacity-building, oriented towards a low carbon economy. Within the framework of the PANCC, Regional Climate Change Committees (CORECC) were set up, integrating governmental authorities and representatives from the private sector, civil society, and academia.

Under the PANCC, Chile developed a National Plan for Adaptation which sets out guidelines for the definition of sectoral plans. There are seven such plans, including one on cities headed by the Ministry for the Environment and the Ministry for Housing (MMA and MINVU, 2018). This initiative has a systemic focus on governance, with guidelines on for urban areas in Chile.

2. City Initiative

Chile has put multiple actions and policy instruments in place to address climate change, some of which are specific to the Santiago Metropolitan Area. Policies oriented towards a clean energy matrix, the introduction of electric vehicles (386 electric buses, the biggest public electric transportation system in Latin America), and the use of small-scale renewable energy in social housing and ecosystems and enhancing the adoption of such win-win options. More importantly, these policies provide a long-term framework for sustained efforts to achieve sustainable urban development and the increasingly ambitious goals for Chile's nationally determined contribution (NDC) to the Paris Agreement. A few examples are highlighted below to show the diversity and varying scale of the initiatives.

In Santiago, the Regional Climate Change Committee (CORECC) was formed in 2017; its main role is to assist, at the regional level, the promotion, articulation and implementation of climate change policies, plans and actions coming from the Ministry of Environment.

The Metropolitan Region of Santiago has undertaken a number of climate change initiatives as follows:

(i) A new decontamination plan for Santiago was developed by the Ministry of Environment in 2016 and approved after public consultation and revision of the law in 2017.[52] The plan aims to attain air quality standards for pollutant criteria such as particulate matter, ozone, nitrogen dioxide and carbon monoxide. It entails emission reductions, some which are of relevance for greenhouse gases other than ozone. It is worth noting that Chile's current nationally determined contribution (NDC) to the Paris Agreement includes a mitigation goal for black carbon to be implemented through air quality attainment plans. Chile's NDC is now open for public consultation.

(ii) At the regional level, through its regional government, Santiago developed a resilience strategy in 2017, with support from the 100 Resilient Cities Program pioneered by the

52 http://bcn.cl/22tx3.

Rockefeller Foundation.[53] The strategy was developed through a participatory process, involving multiple and diverse stakeholders, including academia, public and private sector and civil society. The Resilience Strategy includes climate change as a key element, whichis also acknowledged in four of its six pillars: mobility, environment, disaster risk management and social equity. The Santiago Metropolitan Regional Government has aligned its strategies and initiatives with the SDGs, aiming to highlight its contribution to them.

Air pollution in Santiago City.Source:Resilience Strategy, Gore (2017)

(iii) **One of the priority initiatives of the Resilience Strategy is 'The Santiago-Maipo Water Fund'**, a public-private-civil society initiative that resulted in the creation of a non-profit corporation with the aim of contributing to the region's water security while ensuring availability of water in terms of quantity and quality, safeguarding human wellness, preserving natural ecosystems, ensuring economic development and avoiding natural disasters. This fund has a strategic plan based on six strategic lines: information management, water bodies protection, use efficiencies, risk management, communications and outreach, and land use.

Water funds have the potential to deliver mechanisms for ecosystem-based adaptation. The latter is a people-centric approach that promotes the use of biodiversity and ecosystem services to help people to adapt to climate change and acknowledges that human resilience depends significantly on ecosystem health.[54] Successful EBA initiatives are expected to reduce social and environmental vulnerabilities, generate societal benefits, restore, maintain or improve ecosystem health,support policies at multiple levels, foster equitable governance and enhance capacities (FEBA, 2017).

53 http://santiagoresiliente.cl/.

54 https://www.fondosdeagua.org/content/dam/tnc/nature/en/documents/latin-america/sourcewater.pdf

Among the initiatives already in progress within the framework of the Santiago-Maipo Water Fund, there is a demonstration project of restoration and reforestation for the protection of natural habitats, such as wetlands upstream of the basin, in order to improve the availability of water for the city in the long run. There are also reforestation and education workshops at El Morado Natural Monument; a reforestation campaign at the Río Clarillo National Reserve; and a High Andes wetland monitoring project.

Santiago has recognized the importance of integrating urban mobility into urban development. Urban mobility is a key structuring component of the urbanization process, as it affects and responds to land use change, infrastructure building, socioeconomic fluctuations, urban policies, urban form, lifestyles, and other elements of urban development (Justen et al., 2012). Mobility, therefore, has direct consequences for energy consumption, emissions patterns, and human well-being.

At the municipal level, there are multiple climate-oriented initiatives, many of them developed by mayors organized though a network promoting good practices and capacity-building.[55] Most notable among these, the Municipality of Santiago undertook an initiative in 2016 intended to "invert the transport pyramid" by giving priority to pedestrians, public transport and the promotion of sustainable means of transport such as bicycles and electric vehicles (Lundstedt et al., 2016). This initiative was the first 'nationally appropriate mitigation action' at municipal level. Transantiago (now the Metropolitan Mobility Network -Red) was implemented in 2007, allowing the integration of bus and Metro fares.Notwithstanding much justified criticism (Muñoz and Gschwender, 2008; Gómez-Lobo, 2012; Beltrán et al., 2013; Olavarría-Gambi, 2018), the initiative marked a comprehensive shift from a multi-owner and disorganized public bus fleet of 11,000 units towards an integrated system operated by a small number of private bus companies (selected through an international bidding process) and the state-owned Metro Company. Currently, the underground system has seven lines covering 140 km 6,600 buses running over more than 60 km of segregated bus lanes.[56] Recently, 100 electric buses have been added to the fleet.

3. Key achievements

Cities are increasingly acknowledged as relevant spaces, in terms of both mitigation and adaptation to climate change. Climate change sensitive urban planning requires proactive, integrated, contextualized and complex approaches, making room for the multi-layered and dynamic processes that make up a city (Eraydin and Taşan-Kok, 2013). In this context, the notion of 'resilience' provides a flexible and powerful response to the complex challenges of climate, especially when applied to urban governance (Adger et al., 2011; Eraydin and Taşan-Kok, 2013; DeCaro et al. 2017).

Santiago's policy documents on resilience and climate change are progressive, insofar as they address climate change, but they need to take more fully into account the sensitivities for cities. An analysis of Chile's "Climate Change Adaptation Plan for Cities" (PACCC) and the "Climate Change Adaptation Plan for the Metropolitan Region of Santiago" (PACCRM), highlights that these documents are moving towards a more integrated and proactive understanding of disaster risk management and prevention in tackling climate change.However, their excessive focus on threats and exposures (Clarvis and Allan, 2014), and their static understanding of cities, prevents them from paying due attention to the sensitivities of the different components of cities. They overlook the

55 (https://www.redmunicc.cl/).
56 https://www.red.cl/

structural and evolutionary processes through which cities build and maintain their own resilience to the unrest that affects them (Santiago Metropolitan Regional Government, 2017a; Santiago Metropolitan Regional Government, 2017b).

A positive feature of the strategic documents is their recognition of the cross-cutting nature of climate change and the ensuing consequences.Other positive features include the establishment of the need to promote cross-sectoral coordination and consider the inter-institutional and international dimensions. They also promote a proactive and integrated approach to climate change management and the long-term risks and planning needs that these entail (Welz and Krellenberg, 2016).

However, the documents could benefit from more detail on addressing the city's responsiveness, its reflexive potential and its capacity for self-transformation. Santiago could well benefit from much-improved urban governance and planning, with a territorial perspective that invigorates citizen participation. Such a perspective would include long-term monitoring and characterization of resilience and its key-components, especially the capacity to adapt.Also, technology-based mitigation options, although valuable, are not enough without sustainable urban planning and behavioural changes. Failing that, there is a risk of ignoring key opportunities for integrated, thoughtful and adaptive governance of cities in the face of climate change (Gunderson and Holling, 2002; Ernstson et al., 2010; Pickett et al., 2013; Meerow and Newell, 2015; Meerow et al., 2016).

Conversion and expansion of the public transportation to electro-mobility is one of the main goals of both the Santiago Regional Government of and the Ministry of Transportation through Transantiago.By 2020 Santiago will have the first network of 'electrolineas' with 104 charging points in public spaces (two in each of the 52 communes of the city) as result of a private-public partnership between the Regional Government, COPEC and major gas station companies. The project aims to provide access to electro-mobility throughout the region to all citizens.In the past year, 2018-2019, the National Regional Development Fund (FNDR) funded almost US$1 million to acquire electric vehicles for local municipalities, thereby pushing a policy that prioritizes electromobility in public spending.There is also a new Green Subsidy for taxis that encourages the conversion of the fleet to electromobility.Finally, the public transportation system in Santiago has one of the biggest electric fleets in the world with 386 electric buses to date, and it has the first Latin American terminal exclusively for electric buses. This is aligned with the goal of having a 100% electric public transportation system by 2040.

4. City-to-City partnerships / South-South and triangular cooperation

The United Nations Economic Commission for Latin America and the Caribbean (ECLAC), with its headquarters in Santiago, has a committee on South-South cooperation which is key in facilitating city-to-city partnerships. One of the Committee's main objectives is to strengthen international cooperation for development, including South-South, North-South, triangular and multilateral cooperation.There is growing recognition among the countries of Latin America and the Caribbean that only by combining initiatives and efforts will countries be able to attain the Sustainable Development Goals (SDGs), and that global governance and new partnerships between States, their citizens and the private sector can help to progress momentum towards this agenda. In responding to that imperative, South-South cooperation can make a significant contribution.

SSC has an institutional home in Chile which is helpfully promoting city-to-city partnerships. The Ministry of Foreign Affairs has created the Chilean Agency for International Cooperation

(AGCID), which is a platform for international cooperation and city-to-city partnerships. AGCID, in collaboration with the Ministry of Environment, has organized several international fora on Climate Change. In 2016 and 2017, the AGCID organized the "Environmental Education Programme for Water Efficiency in Educational Communities" with the participation of the Santiago Metropolitan Regional Government , the Santiago Regional Environment Secretariat and the Mexico Federal District Environment Secretariat. The programme took place in both cities and helped to facilitate exchange of experiences and methodologies on tackling water shortages.

Santiago participates in a range of international forums. In 2016, the Santiago Metropolitan Region took part in the C40 Network. Subsequently, Santiago has been participating in the Healthy, Liveable Cities Programme, which has further led to the development of projects on:'walkability and bikeability technical assistance', which seeks to measure and promote bicycle and walking transportation and their effects on health; and,'air quality direct assistance', which aims to evaluate the replacement of wood burning heating systems in residential areas by clean technologies.In 2017, the Santiago Regional Environment Secretariat was invited to participate in a 'Greenhouse Gases Effect Inventory' workshop in Buenos Aires. The event was organized by C40 with the City of Buenos Aires as the host city. In 2018, the Ministry of Environment and the United States Environmental Protection Agency America (USEPA) organized a workshop on air quality in Santiago. Its objective was to provide a forum for policymakers and technical advisers from the public and private sector in the Metropolitan Region of Santiago to discuss issues related to air quality. This workshop was part of the Megacities Partnership, whose main goal is to strengthen governance on air quality in countries of the South.

Santiago is part of the 100 Resilient Cities Network (100RC) which is an important channel for South-South and international cooperation.In December 2017, the City hosted other partner cities and urban resilience experts from the 100RC network for the final network exchange: "Building Resilience at the Network Scale".

City-to-city partnerships have provided a real opportunity for cities to learn from each other. Through the network, the city's chief resilience officer (CRO), and city officials actively interacted in workshops, participated in city visits and living labs and seminars among other events, which has enabled them to interact and learn from each other's experience.So far, collaborative work has included topics such as the circular economy, mobility, disaster risk management, and governance.

Climate change has so far been explored in three dimensions. The first corresponds to the waste management challenge in the Metropolitan Region of Santiago. Santiago produces four million tons per year of municipal residential waste, of which the 90% is sent to municipal landfills.A waste to energy plant project is being studied to tackle the waste accumulation and methane emissions in the region. This project was shared as a city-to-city working experience with Mexico City to learn how the latter managed the many challenges of governance that finally led to the abandonment of the project in the Mexican megacity.

Santiago´s resilience office has been working with its Mexico City counterpart for the past two years on the implementation of the 'resilience communities' project. It seeks to prepare and educate students, parents and communities of three schools in the foothills of the Andes, and one community in Cerro El Peñon,Mexico in climate change and resilience. The outcomes are risk maps, workshops and projects to address the risks posed by climate change in their communities.

The third dimension corresponds to the network of water funds promoted by the Latin American Alliance of Water Funds.[57] This allows collaboration among directors of the funds in order to accelerate the learning process, exchange experiences and knowledge, and also to enhance the visibility and impact of the water funds in the region. The Santiago-Maipo Water Fund has already participated in an exchange of experience with eight other Funds: Mexico City, Monterrey, and Zacatecas in Mexico; Guatemala City, San José in Costa Rica, Yaque del Norte, Santo Domingo in the Dominican Republic; and Santa Marta in Colombia.

5. Conclusion

It is in urban areas that profound transformations must occur if we are to achieve the Sustainable Development Goals (SDGs) and to fulfil the commitments of the Paris Agreement, avoiding the adverse impacts of an unsustainable and fast warming world (Acuto, 2016; Pichler et al., 2017; Grandin et al., 2018; Lamb et al., 2019). This is the key to improving our understanding of the interrelated dynamics of urban energy and land use, mobility, emissions, demographics, governance, and societal and biophysical processes throughout the region and worldwide, particularly when facing the challenges of a changing climate (Pincetl, 2017; Lamb et al., 2019).

City-to-city partnerships and SSC for climate change requires the participation of numerous actors in the Metropolitan Region of Santiago. Multiple actors and levels of action are needed in the context of climate change governance for mitigation and adaptation, and ultimately resilience (Arriagada et al., 2018).Sometimes efforts lack coordination due to the numerous institutions and programmes, which risks a disarticulation of efforts and duplication of actions against climate change. The city has an opportunity to address this fragmented governance by helping to coordinate efforts to tackle climate change in the Region.

The complexity of the issue calls for innovation in terms of the actors, as well as institutional and legislative measures,for long-term planning (Ostrom, 2010; Gupta, 2016; Huitema et al., 2016; Welz and Krellenberg, 2016).Santiago is off to a good start, and continued efforts will require a more thorough understanding and characterization of urban processes, vulnerability and resilience.In addition, more concrete actions are required to ensure a better prepared city, including infrastructure investment programmes, enhanced services, an appropriate framework of governance, and strengthened citizen engagement (Gallardo et al., 2018).

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UNDP: Bujumbura (Burundi) – SingaporeCooperation on a Master Plan for sustainable urban development

Abstract: The city of Bujumbura has an objective to effectively manage growth and development while providing better living conditions and an inclusive working environment for its inhabitants. However, this objective is faced with some key challenges such as effective management of rapid urbanization, rising youth unemployment, pollution and climate change effects. As a response to these challenges, the city of Bujumbura, with the support of UNDP and in partnership with Singapore, developed the Bujumbura Master Plan/vision 2045, which is a strategic instrument for effective coordination of sustainable development of the city. The unique selling point of this conceptual approach is inclusive city planning based on four main zones, unifying social, economic and environmental development to optimize sustainable land occupation and water management.

1. Context

Bujumbura
Population:1 092 859 (2019)
Land Area:127 square kilometres
Bujumbura Municipality established:1962

The city of Bujumbura is witnessing rapid and unplanned urbanization – which brings both opportunities and challenges.The city of Bujumbura is expected to host about 4.1 million persons and create 2.1 million job opportunities by 2045.As the former political capital and current economic capital of Burundi, the city of Bujumbura is the largest urban centre with specialized industries in textiles, leather, paper, chemicals, and agricultural products. The city is the export hub for mineral resources and most cash crops such as tea, coffee and cotton. It is located along on Lake Tanganyika and is a strategic junction for transport and trade with the Great Lakes region.In this respect, based on its development potentials, the city of Bujumbura's objective is to effectively manage growth and development while providing better living conditions and an inclusive working environment for its inhabitants.

However, this objective is faced with some key challenges.Unplanned and continuous urbanization is leading to the growth of informal settlements, ineffective transport systems, vulnerability to climate and weather-related events, and environmental contamination.

With constant migration of people from different parts of the country, the city of Bujumbura is faced with fundamental changes in housing schemes, lifestyles and recreational facilities for its inhabitants. With little coordination of the urbanization process coupled with limited capabilities for urban planning and management, there issignificant pressure on the city's infrastructure, and high concentration of population, mainly in peripheral districts where the density sometimes reaches more than 2,000 inhabitants per km². Nevertheless, Burundi Vision 2025 aims to change the rate of urbanization to 40% in order to increase the total surface area of arable lands and to provide non-agricultural job opportunities in the urban environment.

Youth unemployment is gradually increasing throughout the country. With a youth unemployment rate of 2.86%, youth have turned to urban migration as a coping strategy for unemployment. In effect, securing a sustainable livelihood and a decent job are the aspirations of youth. Employment is crucial in an environment where the labour market is characterized by mounting demographic pressure, high dependence on the agricultural sector, fewer on-the-job training opportunities, and the prevalence of the informal sector. This situation applies equally to youth in the city of Bujumbura.

Lastly, the city is highly vulnerable to climate change effects and environmental pollution. It is exposed to natural hazards such floods and landslides. Fundamental causes are soil degradation, deforestation and population density. Internal displacement of persons is sometimes caused by floods and landslides. In addition, there is pollution of Lake Tanganyika resulting from the disposal of non-biodegradable items and industrial waste.

2. City initiative

As a response to the key challenges faced by the city of Bujumbura, in 2015, the Government launched the Bujumbura Master Plan 2045, a strategic instrument for effective coordination of sustainable development of the city.

The unique selling point of this approach is inclusive city planning based on four main zones, which unifies social, economic and environmental development to optimize sustainable land occupation and use. The city development plan, through zoning, is a gazetted plan to regulate the development of each land parcel within the city. This includes permits for land use, density, building height, and other control guidelines. The first zone is for residential purposes, while the second and third are for commercial and industrial uses respectively. The last zone is comprised of parks and open space for recreation, agriculture and protected areas.

The implementation of the Bujumbura Master Plan has been structured in three phases. The Plan's short-term phase (2015 – 2025) focuses on economic diversification and prioritizes investment in key industrial, trade, tourism and infrastructure projects. The medium-term phase (2025 – 2035) will focus on social projects to improve quality of life and decentralize economic development to distribute growth. The long-term phase (2035 – 2045) will complete developments recommended in the social, economic and environmental sectors to promote Bujumbura as a vibrant waterfront hub of Lake Tanganyika. Consultative and validation meetings with different stakeholders were organized both at national and subnational level to develop this initiative, in line with SDGs 9, 11, 12 and 13.

3. Key achievements

The city of Bujumbura has put in place a three-level institutional mechanism to manage the city's development. This includes a consultative Commission, a Public Works Authority, and official public works plans. These mechanisms are present at national, provincial and local council level.

The main achievement of this initiative is the existence of operational plans.This includes plans for the urban transport network, economic development, residential and community, green and blue networks, and environmental management, tourism development, and land occupation. With the right resources and capabilities, these plans facilitate city development.

Conceptually, this approach has enabled Bujumbura to progress the development of an approach to urban planning.However, the private sector was yet to be mobilized, and the implementation of the plan was delayed.More recently, in 2017, two neighbouring cities were added to the urban masterplan in order to facilitate mobility between the three provinces (Iwacu, 2017).

4. City-to-city partnerships / South-South and triangular cooperation

A cooperation agreement was signed between the Governments of Burundi and Singapore, with the support of UNDP. This tripartite agreement has enabled the provision of urban planning and advisory services by Singapore, focused on the design of an innovative master plan to guide the development of the city of Bujumbura and its surroundings by 2045.

Photo:The vision – Changing the landscape of Bujumbura by 2045 (Iwacu, 2017).

Under the Agreement, the Singapore Cooperation Enterprise (SCE) an agency of the Ministry of Trade and Industry and the Ministry of Foreign Affairs which exports Singapore's development experience, **provided technical assistance, consultancy services and sharing of Singapore's experience of best practice in urban development with Bujumbura**.The project, which spanned 18 months, included 12 months of Master Plan preparation and 6 months of capacity-building.SCE undertook transfer of know-how and best practices in urban development to the Burundi Government urban planners, to successfully design the Master Plan.SCE had previously provided similar support to five districts in Rwanda (SCR, 2014).

5. Conclusion

The Bujumbura City Master Plan initiative unifies social, economic and environmental development on a single platform to optimize sustainable land occupation and water management. All implementation plans are available, including institutional mechanisms. This model of urban development is being expanded beyond Bujumbura City and has the potential to be replicated to other parts of Burundi and beyond.

SSTC, facilitated by UNDP, has been a key driver of the current achievement. There is high level Government buy-in for implementation of the Plan.Nevertheless, buy-in from private sector has yet to be achieved in terms of mobilization of resources and capability for effective implementation of the Master Plan.

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China: Developing a Sponge City - Innovative practices in Shanghai

Abstract: Confronted by rapid urbanization and a changing climate, cities are facing immense challenges to sustainable development. Urban water-related issues are one such major challenge, as unregulated construction means that natural systems are not able to capture and store water, leading to floods or water scarcity. To mitigate the urban stream syndrome and capture rainwater, China initiated the Sponge City construction programme in 2013. This case study focuses on the experience in Shanghai, which has proved to be effective in coping with climate change, mitigating urban flooding risks, and improving water quality. It offers a successful example for cities in other developing countries to draw on.

Skyview of a pocket park in Lingang, featuring green roofs, permeable plaza, and wetland. (Provided by the China (Shanghai) Pilot Free Trade Zone Lingang Special Area Administration)

1. Context

Chinese cities are experiencing some of the fastest urbanization rates in the world.Consequently, the land surfaces are being continuously modified with artificial construction material, such as concrete pavements, that do not allow water to permeate.This causes the "urban stream syndrome" which refers to the ecological degradation of streams draining through urban landscapes. This could further result in excessive flooding due to stormwater runoff from roofs and streets, poor water quality due to untreated wastewater and other urban pollutants, or lower groundwater levels. thereby affecting urban populations, habitats and ecosystems.

Shanghai

Population:24.24 million (Shanghai Government, 2018)

Land Area: 6340.5 square km

With warming temperatures and climate change, increased atmospheric water-holding capacity and rainfall intensity, cities are becoming increasingly vulnerable to urban waterlogging. To address these water-related issues, the President of China, Xi Jinping, put forward

the concept of Sponge City construction in September 2013.Thereafter, the Sponge City construction concept has been developed into a national strategy and is being rolled out across several cities in China.

The term 'Sponge City' describes cities that can adapt flexibly - like sponges.This includes adapting to changes in the environment, so that they absorb, store, filter and purify rainwater, and can make use of the stored water when necessary. Thus, the construction of a Sponge City could reduce the occurrence of urban waterlogging and the subsequent damage to urban infrastructure. The concept of Sponge City is similar to that of the Low Impact Developments (LID) in the United States or the Water Sensitive Urban Design (WSUD) in Australia but adopts a more comprehensive perspective.

2. City initiative

China's Sponge City programme aims to make cities more resilient to climate change and urban expansion. The concept involves a holistic approach to design and construction that is able to absorb and purify excess rainfall in an environmentally and ecologically friendly way, so that it reduces flooding and polluted runoff.The facilities can include urban greening through rooftop gardens, rainwater harvesting, recycling and drainage, permeable roads, ponds and lakes, and rain gardens. The sponge projects constructed are required to meet specified criteria ensuring that: the frequency of urban waterlogging for rainfall intensity is longer than a 1-in-5 years return period; the frequency of urban flooding for rainfall intensity is longer than a 1-in-100 years return period; water quality is improved; and, the urban heat island effects are mitigated.

Shanghai has set targets for its Sponge Cities:

By 2020: 20% of urban built-up area should meet the requirement of a Sponge City

By 2030: at least 80%.

To guide Sponge City construction, the Shanghai local government formulated a "Special plan on Sponge City construction in Shanghai (2017-2035)". This planning document set specific targets for construction of sponge facilities as they relate to four aspects, namely:water ecology, water safety; water environment; and water resources.Shanghai's territory was divided into 15 subregions to implement the Sponge City construction.

The Chinese Government also put forward a series of supportive legislation, including: construction guidelines for stormwater by the Ministry of Housing and Urban-Rural Development (MOHURD) (2014); the establishment of a special fund set up by the Ministry of Finance (MOF), MOHURD, and Ministry of Water Resources (MWR) for 30 pilot cities; and revision of codes for the design of urban green spaces and design of urban road engineering to align with the Sponge City guidance (2016).

Lingang District, the largest of the 30 Sponge City pilot projects in China, was selected in 2016 by the MOF, MOHURD, and the MWR. Its Sponge City construction is designed to capture and store rainwater, and includes the principles of ecological conservation, ecological restoration, and low-impact development. The construction of Lingang Sponge City is nearing completion over a period of three years. Currently, the newly constructed green spaces are over 500 hectares, which plays a considerable role in mitigating water-related issues. Specific projects include, but are not limited to, sponge buildings and residential areas, sponge road and leisure square, sponge park and greening facilities, drainage system enhancement, and waterways reconciliation. The Shanghai government has

also released documents to guide the construction/management of Sponge City.For example, the "Framework for indicators of Shanghai Sponge City construction" (2015), "Technical guidelines for Sponge City construction in Shanghai" (2015) and "Atlas for technical standards of Sponge City construction in Shanghai" (2016).

Photo credit:Ecological parking lot of Xinluyuan neighbourhood (Provided by the China (Shanghai) Pilot Free Trade Zone Lingang Special Area Administration)

3. Key achievements

Living conditions have improved considerably for the residents of Lingang, and these measures are helping the city to be more resilient during both rainy and dry seasons. The introduction of 'pocket parks' in Lingang is helping to mitigate the problems of waterlogging and helps to counter landscape singularity by introducing green spaces for its urban residents within dense urban areas.News articles report that pocket parks are highly appreciated by the local residents, because they are constructed with ecologically friendly elements, which suit local conditions (People's Daily, 2018).

The Lingang Jiayuan community centre, along with the surrounding green leisure square, covers a total area of around 1.3 hectares, and its newly constructed green infrastructure accounts for 66% of the total area. This alone enables the absorption of an additional runoff of 190m^3 over and above the existing runoff of 158 m^3. Water permeable pavements, rain gardens, green roofs, artificial surface flows, all are helping to store rainwater and reduce flooding (Shanghai, Lingang Special Area Administration, 2019).

The city-wide environmental, social, and economic benefits of the Sponge City construction in Shanghai are starting to manifest themselves. The environmental benefits include reduced urban waterlogging and water

Reflections from Shanghai's Experience

- Sponge City usefully adopts holistic thinking and a master plan before starting construction;
- Clear planning goals and tangible construction standards were helpful in guiding implementation;
- The ecological green infrastructure and municipal grey infrastructure should be coordinated instead of being undertaken separately;
- Stakeholders should be involved in the construction of Sponge City processes, and city managers should reach out and facilitate cooperation;
- Public awareness is critical for building a sustainable Sponge City. Academic and business institutions can help to raise public awareness of Sponge City strategies and practices;
- Practical consideration of local conditions in both natural and social dimensions should be integrated into the Sponge City construction;
- Start with pilot projects, then scale up;
- The use of natural design and environmentally friendly materials are encouraged.

pollution, increased urban ecological biodiversity, urban heat island effects alleviated, recovering hydrological ecosystem, etc. The social benefits include enhanced landscape aesthetics, more enjoyable public leisure spaces, increasingly harmonious neighbourhood relationships, etc. The economic benefits include reduced economic losses caused by urban flooding or waterlogging, increased surrounding house prices, etc.

The advantages of adopting the sponge measures in urban settings as an alternative to traditional hard-engineering control measures are clear. For instance, Lingang's World Expo City area successfully collects and purifies rainwater to build waterfront public space by following the sponge construction code. Similarly, the Wujiaochang sunken plaza has effectively alleviated the waterlogging issue during rainy days by installing permeable pavements, which quickly transfer the excessive surface runoff.Water storage capacity has increased in Lingang District.More than 40 km of rivers and 51 hectares of regulating lakes have been newly constructed, which offer more than 900,000 m^3 storage capacity and have greatly increased their regulating capacity during storms (Shanghai, Lingang Special Area Administration, 2019).

The Sponge City concept was applied to strengthen riverbanks, bringing significant benefits. In the Lingang District, the Sponge City concept was used to reconstruct the riverbanks of the Litang River which runs adjacent to densely populated urban areas and was previously at risk from partially collapsed riverbanks, severe soil erosion, and pollution from rainwater. Following public consultations and local investigations, a year of reconstruction work was carried out. The improvements have been significant:the controlling rate of annual total runoff is over 90%, the controlling rate of polluted water into the river has reduced to 60%, the riverbank is 100% ecologically built, and the rainwater recycling rate is 6.7%. (Shanghai, Lingang Special Area Administration, 2019).Moreover, the water quality meets the requirements of Chinese national surface water standard.

Sponge City guidelines were also applied to the reconstruction of 26 old residential districts, spanning 200 hectares, bringing benefits to its residents. Approx. 58% of the 36 km of newly constructed or reconstructed sponge roads have also come into service ((Shanghai, Lingang Special Area Administration, 2019).The successful implementation of these projects has enabled the city to replace old systems of mixed rainwater drains and sewers, which has solved problems of waterlogging and road decay, while greatly improving water quality for residents.

4. City-to-city partnerships / South-South and triangular cooperation

Shanghai attaches great importance to SSC in environmental protection and ecological construction, including through its experience of Sponge City activities. With the successful implementation of the sponge facilities in Shanghai, many events have been hosted to disseminate knowledge among developing countries regarding the experience and technology of Sponge City construction in Shanghai.

In October 2015, a workshop on "Planning for Greener Cities and South-South Cooperation in Africa" was successfully held in Tongji University in Shanghai. Water resources management was one of the main topics of this workshop. Twenty-five representatives attended from eight African cities including Yaoundé (Cameroon), Addis Ababa (Ethiopia), Kiambu County (Kenya), Abidjan (Côte d'Ivoire), Niamey (Niger), Kampala (Uganda), Lusaka (Zambia), Harare (Zimbabwe). Four mayors, two deputy mayors and nearly twenty directors and deputy directors of environmental protection and urban development were among the attendance. A memorandum of understanding (MOU) on safe water supply was co-signed at the forum by three parties, including Tonji University, City Council of

Harare and Chinhoyi University of Technology. This MoU was agreed to initiate collaborative projects of technology training, research and demonstration projects on safe water supply. The collaboration aims to tailor China's technology to help Harare to cope with the challenges of water supply and climate change.

In September 2016, UN-Habitat and the government of the Chongming district of Shanghai co-signed a Memorandum of Understanding on future sustainable development. The two parties are working through the mechanism of SSTC to boost the application of advanced technologies in water treatment, agricultural infrastructure construction, ecological protection and restoration to other developing counties.

In September 2019, an international seminar "Climate, water and energy coupling and the South-South Cooperation" was co-sponsored by the Shanghai Institute for International Studies and the Shanghai Academic Society for Eco-Economy. The seminar helped to boost cooperation between China, India, Bangladesh, as well as other developing countries, on safety of water resources and energy and offered case study examples of SSC from which other countries could draw experience.

5. Conclusion

Recognizing that the adverse impacts of climate change and unplanned urbanization can undermine the ability of cities to achieve sustainable development, China initiated the Sponge City construction programme to address its urban water-related issues. This innovative programme is adopting a variety of measures to reduce the negative impacts of urban activities and climate change by integrating ecological technologies with the idea of harmonious coexistence between humans and water. The Sponge City construction in Shanghai seeks innovative solutions to cope with future water challenges, which are making the city more resilient.

A nature-based approach to Sponge City construction is helping Shanghai to build sustainable cities and communities, while mitigating the adverse impacts of unplanned urban construction and traditional infrastructure. Shanghai's efforts are generating a series of environmental, economic and social benefits and contributing to the SDGs.Water recycling is more sustainable, the pressure of urban water supply and drainage facilities is alleviated, and communities are benefiting from more harmonious environments, thus improving their well-being.The Sponge City construction in Shanghai has also motivated industrial and infrastructural innovation. The media and public education campaigns have helped to strengthen public environmental awareness. Going forward, China has the opportunity to strengthen its proactive role in SSC, and in sharing its best practice and experiences with other cities on green and sustainable urban planning and management.

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IV. CONCLUSIONS AND THE WAY FORWARD

"Cities are where the climate battle will largely be won or lost",- UN Secretary-General António Guterres, C40 Mayors Summit, October 2019

The world is at heightened risk of environmental and climate change due to human-induced anthropogenic activities. Recent years have seen unprecedented international recognition of the need for collective action in order to build a sustainable, safer and more prosperous future for all.

Landmark international commitments have framed the approach to collective action. The 17 Sustainable Development Goals (SDGs), agreement at the COP21 Paris Climate Conference, and the Sendai Framework for Disaster Risk Reduction are three global-level agreements that brought together stakeholders around common targets to manage the risks of climate change, reduce emissions, and build resilience (Box 3). While these commitments were made at global and national level, countries are taking action through their national climate action plans under the Paris Agreement, and **there has been growing international recognition that cities are critical to global efforts to take and scale up climate-related actions**. The New Urban Agenda has focused attention on sustainable and participatory urban development.

Box 4: Key international agreements (2015, 2016) -at a glance

The United Nations Sustainable Development Goals (SDGs) were adopted by all Member States as a blueprint to achieve a better and more sustainable future for all by 2030.

The Paris Agreement (2015) within the United Nations Framework Convention on Climate Change (UNFCCC), committed signatories to maintaining global warming to well below 2.0°C above pre-industrial levels and to efforts to limit the increase to 1.5°C.

The Sendai Framework for Disaster Risk Reduction (2015-2030), adopted by UN Member States in 2015, outlines voluntary, non-binding priority targets and actions to reduce and prevent disaster risks and loss of life, livelihoods and health.

The New Urban Agenda, adopted at the HABITAT III Conference in October 2016, sets a new global standard and a roadmap for the economic, social and environmental development of cities.

Climate change has become integral to sustainable urban development, and the need for action is becoming increasingly urgent. Cities are home to half the world's population, and, with rapid urbanization, this is projected to grow to two thirds by 2050. As engines of growth and development, cities are also contributors to greenhouse gas emissions that impact climate change. The rapid scale and pace of urbanization is associated with climate risks and adverse impacts.For instance, cities are prone to higher temperatures, heatwaves and urban heat island effects, as well as air pollution and environmental degradation.Scientists project that, with a warming climate, the frequency and intensity of extreme weather events is likely to increase (IPCC). Cities could consequently face flooding, sea level rise, droughts, and loss of land, ecosystems and biodiversity for which they may be ill-prepared. These climate and weather-related events also bring increased risks of disease and loss of life, livelihoods and assets, disproportionately affecting the *most vulnerable* - especially in developing countries.

A growing body of evidence recognizes that local climate action is required to ensure that cities are able to grow sustainably and meet the future needs of their citizens. This is also

reflected in SDGs 11 and 13 which are inextricably linked.SDG 11 aims to "Make cities and human settlements inclusive, safe, resilient and sustainable", while SDG 13 aims to "Take urgent action to combat climate change and its impacts".Additionally, SDG 17, "Partnerships for the Goals" further provides the impetus for SSTC as a vehicle for supporting delivery of the goals and for unlocking the transformative power of collective knowledge and resources.

The scale and pace of urban expansion across geographic regions varies, thus providing opportunities for cities to learn from each other.

Box 5: UNDESA, Revision of the World Urbanization Prospects data set (2018)

Global urban populations are expected to increase from 55% in 2018 to 68% by 2050.This signals an increase of a further 2.5 billion people to urban areas from current levels of 4.2 billion.90% of this increase is expected to take place in Asia and Africa, and the world is projected to have 43 megacities, mostly in developing countries, by 2050.By contrast, urban populations in most developed nations are expected to decline. (UNDESA, 2018)

Asia is the most rapidly urbanizing region with 50% of its population living in urban areas. Home to a diverse population of over two billion people, Asia is witnessing rapid urbanization alongside sustained growth over the last few decades. Asia's urban agglomerations host several megacities – with populations exceeding 10 million people. High population densities mean that urban planning and management need to take account of pressures on land, natural resources and environmental services in planning their infrastructure development.

Africa is facing unprecedented rates of urbanization, and its population is expected to treble to some 1.2 billion by 2050 (UN-Habitat, State of the World's Cities). With both rapidly expanding megacities, and the emergence of secondary and intermediary cities which are crucial to the rural-urban connect, Africa will need comprehensive strategies that plan for future patterns of urbanization and how municipal authorities can play a greater role in this process. As Africa pursues it growth potential, there are opportunities as well as challenges in adopting a low carbon, resilient model of growth that can bring sustainable benefits to its citizens in the long term.

Latin America could be considered as the most urbanized region in the world having experienced rapid urbanization over the last half century.Although some 80% of its population now live in cities, an estimated one-fifth of them live in poor shanty towns that are vulnerable to environmental hazards and weather-related events.Whilst on the one hand Latin American countries are highly exposed to global environmental risks, migration and natural disasters, they are also home to some of the largest environmental resources (water, forests), and biological reserves in the world.

Despite regional and sub-regional variations, studies are showing that although larger cities may be well-resourced, this does not necessarily mean that smaller cities are disadvantaged in comparison.For instance, a World bank report (World Bank, 2015) on competitive cities found that some secondary cities were outperforming larger cities in terms of growth and foreign direct investment.

Cities need to take measures to reduce their greenhouse gas emissions and to increase their resilience so that they can enhance the quality of life for their citizens and prepare for a more sustainable future. This will require significant shifts in their growth strategies and mitigation and adaptation measures.Changes in population demographics also bring new dynamics to urbanization.Increases in urban population density mean that cities have to gear up to provide adequate and affordable transportation, ensure access to basic services, infrastructure and land-use

planning, and responses to extreme events.Policy measures need to look beyond purely technical and economic solutions, and also reflect a range of population characteristics, such as migration, age, spatial distribution, and gender.

However, cities also face several challenges that may limit their climate policy and action. Firstly, the city governments may havelimited mandate, jurisdictions and decision-making powers with respect to public services, or these may be framed within larger national policies, e.g. water or transportation networks and systems, thus limiting their ability to act. Secondly, as revenues may be limited, cities may not have the means to raise finance for green infrastructure. Thirdly, responsibilities for services are often dispersed across various departments, thus a coordinated approach to planning and implementation is lacking; and, finally, city authorities may have limited institutional capacity to take action on climate change due to lack of technical expertise, knowledge, or political will.

Activities supported through SSTC could be a powerful motivator for empowering and supporting cities to undertake climate action.Several intergovernmental, multilateral, bilateral and international organizations are engaged in SSTC activities at global, regional, national and local level.There also exist a multitude of SSTC initiatives which are helping cities to expand their commitments to curb greenhouse gases. Examples from the case studies in this publication show that SSTC approaches are successfully providing forums for dialogue and diplomacy, facilitating capacity-building, promoting the sharing of knowledge and ideas, facilitating peer-to-peer exchange, promoting inclusion and wider stakeholder participation, supporting the deployment of innovative technologies, and helping to develop new financing mechanisms.

Several UN entities, funds and programmes are at the forefront in integrating SSTC in their respective strategies and workplans. As the case study examples show, UN specialized agencies, funds and programmes, including UNDP, UNDESA, UNEP, UNESCAP, UNFPA, UNICEF, UNIDO, FAO and ILO, are using their comparative advantage to facilitate and undertake innovative and inclusive programming to advance SSTC in the context of urbanization and climate change. There are also several notable examples of inter-agency cooperation, such as between UN-HABITAT and UNEP, that are helping to bring a more integrated approach to cities and climate action.

The United Nations Office for South-South Cooperation (UNOSSC) is also playing an important role in promoting, coordinating and supporting SSTC globally and within the United Nations System.Established by the UN General Assembly in 1974, and hosted by UNDP, UNOSSC has a mandate to advocate for and coordinate South-South and triangular cooperation on a global and UN system-wide basis.

UNOSSC also manages the implementation of Trust Funds[58] **that support collaboration and piloting of South-South initiatives across the globe**, including: the UN Fund for South-South Cooperation, the UN-India Trust Fund for Sustainable Development, India-Brazil-South Africa Facility for Poverty and Hunger Alleviation (IBSA Fund), and the Pérez-Guerrero Trust Fund for South-South Cooperation (PGTF), which is managed by UNOSSC on behalf of the Group of 77 (G77).

To address the increasing impact of climate change, the UNOSSC also leads and coordinates the efforts of UN to enhance SSTC on climate actions in supporting the implementation of the United Nations Secretary-General's Climate Change Engagement Strategy.

58 UNOSSC Trust Fund Management website: https://www.unsouthsouth.org/our-work/south-south-trust-fund-management/

Through a SSCT framework focused on urban sustainable development, it is expected that cities and local governments can contribute significantly to fostering sustainable development and addressing climate change (from the perspective of both mitigation and adaptation).

Although SSTC has gained visibility in the last decade, cooperation between and among countries has not been sufficiently well documented and this difficulty is even more significant in the context of city-to-city partnerships.

UNOSSC recently launched its South-South Galaxy platform[59] at the UN Day for South-South Cooperationin 2019.This serves as a one-stop-shop for global knowledge sharing and a partnership brokering platform to connect and inform Southern partners.

The way forward:Future areas of cooperation

The BAPA+40 Outcome Document, which sets out a roadmap for SSC, has focused attention on the trends of rapid urbanization and migration in developing countries and has called for greater SSTC initiatives through coordinated policies and sharing of knowledge, solutions and experience, and by raising productivity, resilience and sustainability at local level. This is significant, as it provides the impetus for intensifying action in the Global South.

This section offers some reflections on how SSTC can continue to support global efforts on sustainable, climate-sensitive urban development.

1. **Engage with the new dynamism and partnerships as drivers of sustainable urban development:**Large emerging economies are stepping up efforts to facilitate SSC and playing a pivotal role in bringing new dynamics to development.China's Belt and Road Initiative, India's partnerships with Africa and within the Indo-Pacific region, the emergence of new Development Banks and Export-Import Banks, the BRICS partnership, the G20 and other groupings of like-minded actors, are bringing a new dynamism to SSC.Economic and transport corridors are linking cities within and across regions, bringing new urban dynamics, particularly for secondary cities that lie along these corridors. Cities must therefore increase their preparedness for, and responsivenessto these new challenges and opportunities. The modality of SSTC could further encourage and promote long-term strategies that incorporate a green, low-carbon approach to ensure sustainable urban development.

   The transformation to low carbon, urban resilient pathways requires participatory and inclusive approaches.The involvement of a wider range of actors, including political leadership, local expertise, scientists, researchers, civil society and the private sector, in local decision making can help to build trust, strengthen the use of science and evidence in policy making and help local authorities to choose optimal solutions in a transparent manner.

2. **Shape the agenda and respond to changing realities:**With multiple development issues and interests competing for global attention and resources, SSTC could enhance efforts to provide platforms for cities to raise their voice and influence global agendas.Knowledge sharing on green urban development could be further promoted through peer-to-peer learning, networks, and through workshops and learning events. This could be extended to a broader set of stakeholders, so that they are contributors to the process.As countries pursue urban development, based on their local contexts, SSC can help facilitate the alignment of these processes with global best practice and international standards.

59 UNOSSC South-South Galaxy Platform: http://www.southsouth-galaxy.org/home-page/

3. **New themes, new entry points:**Cities are high consumers of energy and produce significant waste, thusleaving a large carbon footprint.The integration of new themes into SSC initiatives for cities, such as resource efficiency, sustainable production and consumption, the circular economy, air pollution, water quality, waste management, plastics and marine litter, can help cities to adapt to the new realities of urbanization and take early action through an integrated approach that takes account of social, environmental and economic aspects.

4. **Use science and technology for transformative change:**The UN's Global Sustainable Development Report, "The future is now: Science for achieving sustainable development" (2019), presents a strong case for the critical role of science in achieving rapid progress towards the SDGs and to transformative change at scale.The report also references an expert panel, convened by Nature Sustainability, that calls for "cross-regional collaboration, the development of urban observatories, and a strengthened link between multilateral organizations and cities."

   Independent scientific perspectives that bring evidence and knowledge can help in understanding the new realities of a changing climate, innovative technology and digital connectivity, and changing demographics, and therefore help to inform and support policy action on the SDGs. Harnessing the role of smart technology and data can help urban planners to take action and bring rapid improvements in the lives of the urban poor, while also ensuring that all three dimensions of the Sustainable Development Agenda –economic, social and environment –are tackled in an integrated manner. Technological advances, the use of artificial intelligence, and big data can also create new opportunities. Several urban authorities at national and city level are experimenting with new technologies and developing smart cities. Developing countries can benefit from the exchange of local technologies, experiences and lessons so as to progress towards the achievement of the SDGs in a more resourceful and informed manner.

5. **Communicate successes, laying the basis for scaling up of good practice.**SSTC can play a vital role in identifying and disseminating good practice, undertaking further in-depth research on emerging issues and critical topics, and facilitating partnerships between cities. Many international and regional frameworks provide forums for cities to participate in the exchange of knowledge, ideas, technologies, and approaches. Cities should continue to be encouraged to make use of these learning platforms.

6. **Solutions for sourcing finance and investment:** Low carbon urban development and green infrastructure require significant finances, which city authorities are unlikely to be able to mobilize, either their own revenues or by raising finance in capital markets.Cities are developing and testing innovative models – such as green bonds in Mexico City and Johannesburg, public-private partnerships in Asian cities, carbon banking schemes for families in Gwangju city, South Korea, and could potentially share their experiences and lessons with other developing countries. Triangular cooperation can also help cities to develop innovative financing tools, business models and other mechanisms to overcome financial barriers, including by reducing risks to investment in low-carbon technology and solutions. The United Nations, in the framework of the Convention to Combat Desertification (UNCCD), is partnering with African Risk Capacity on the creation of a new financing vehicle, the eXtreme Climate Facility (XCF)[60] - to tap into capital market resources to provide financial support to African countries affected by extreme weather events, encourage best practice in public policy and integrate climate science into its functions.

60 https://www.unccd.int/news-events/africa-developing-new-tools-build-resilience-future-drought-shocks

7. **Leave no one behind:** While cities are increasingly sensitized to citizen-centric and inclusive approaches to urban planning and management, more attention needs to be focused on integrating gender issues into urban planning and climate action. Likewise, youth are important stakeholders in planning their futures; youth groups can play a crucial role in spearheading local climate action in their cities. SSC can help to convene representative groups on these issues, provide capacity-building and strengthen the evidence base of what works best in which context. For instance, through the Youth4South Programme, UNOSSC and WFP-China have partnered to promote SSC focusing on youth and cities.This programme promotes dialogue among youth from developing countries, and facilitates capacity development, knowledge exchange and access to expertise.

8. **Promote greater inter-agency urban-environment partnerships**. The Greener Cities Partnership,[61] a joint effort between UNHABITAT and UNEP, is oriented towards greener, resource-efficient and resilient cities in the delivery and implementation of the New Urban Agenda.The focus of collaboration is on three priorities: resilient, resource-efficient cities; sustainable transport and mobility; and solid waste and wastewater management. This could not only leverage wider partnerships and resources, but also pave the way for deepening SSTC through a more integrated, joined-up approach.

In conclusion, SSTC is not intended as a panacea for resolving urban and climate change challenges but offers a broader paradigm that goes beyond traditional development aid programming. It presents the opportunity to strengthen solidarity between countries of the developing South, build consensus on issues that need urgent action, and draw on innovative experiences grounded in the shared challenges and practical realities of developing countries.

In order to secure sustainable urban futures, cities will need to adopt new approaches to urban planning and management that go beyond business-as-usual infrastructure-driven urbanization. This will need to include integrated and participatory approaches across sectors (including energy, transport, waste management, land use) that involve both mitigation measures and adaptation to new climate conditions, able to harness low-cost, green sustainable technologies.

The BAPA+40 Outcome Document presents a solid framework for stakeholders to come together to strengthen collaborative efforts to implement the 2030 Agenda and to ensure a more transparent, holistic and integrated approach to economic, social and environmental considerations in urban planning and management. The UN development system is called upon to assist developing countries in building the human and institutional capacity needed to formulate and implement national SSTC development policies, strategies and programmes. Member States are encouraged to increase their use of triangular cooperation.

The United Nations Office for South-South Cooperation, as the focal point for promoting and facilitating SSTC, and the UN Regional Commissions, country Teams, and UN agencies, funds and programmes, stand ready to support this important process.

61 https://unhabitat.org/unep-and-un-habitat-greener-cities-partnership

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